



Greening Existing Buildings

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July 28, 2011

Overview

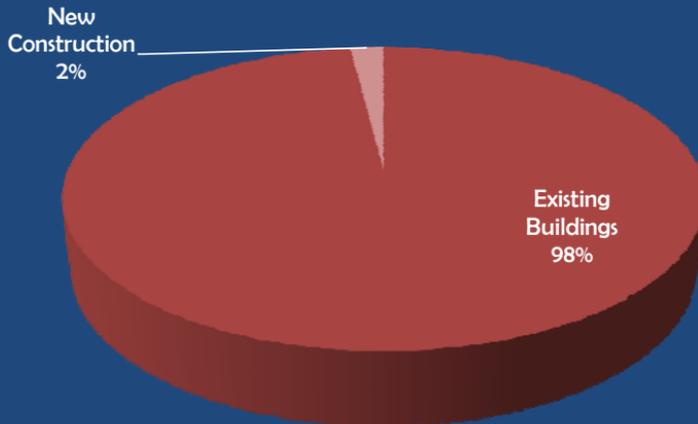
- Why Existing Buildings are Important
- LEED for Existing Buildings
- Green Strategies
- Green Building Case Studies
- Government Incentives



Why Existing Buildings are Important

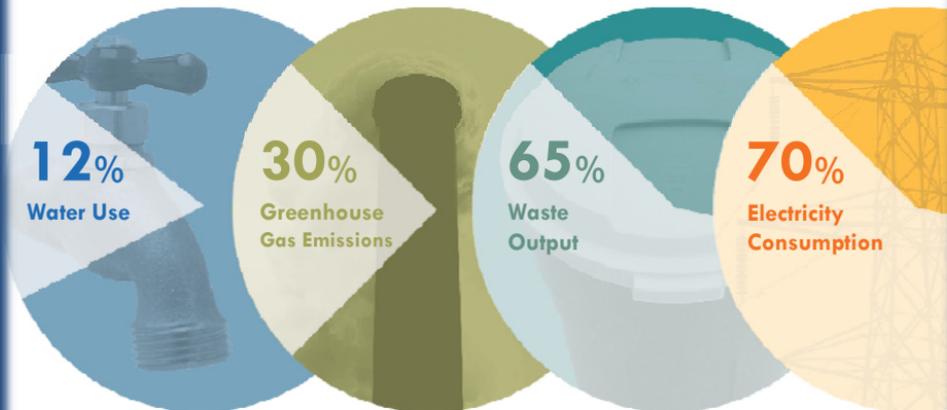


Fairfax Co Existing Commercial Buildings



Annual Fairfax County Office Space Construction
Approx. 4.2M new construction per year versus 219M total
Source: www.fairfaxcounty.gov

Environmental Impact of Buildings



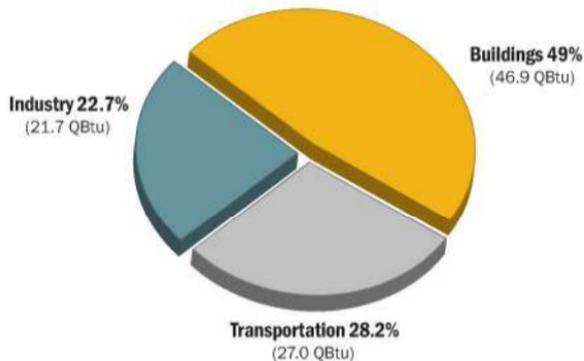
Source: US Green Building Council

Environmental Benefits

- Reduce consumption of natural resources
- Decrease strain on infrastructure
- Divert waste from landfill
- Reduce CO₂ emissions

Impact on Climate Change

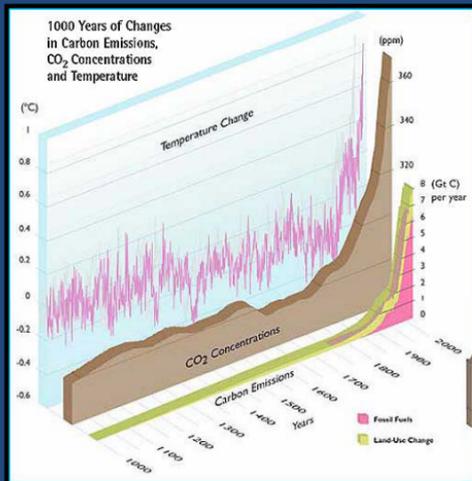
Where do Greenhouse Gases Come from?



U.S. Energy Consumption by Sector

Source: ©2010 2030, Inc. / Architecture 2030. All Rights Reserved.
Data Source: U.S. Energy Information Administration (2009)

Impact on Climate Change



Source: www.350.org



Impact on Climate Change

Nearly 3.5 billion cubic feet of CO₂ emissions created by Tysons Corner buildings could fill up the entire volume of all of the buildings in Tysons every 8 days.



DOUBLE the emissions of an average coal-fired power plant!

Health Benefits

- 41% reduction in respiratory illnesses¹
- Fewer sick days
- Reduced instances of mold growth
- Significantly fewer cases of Sick Building Syndrome



Source: ¹ Carnegie Mellon Center for Building Performance

Productivity Increases

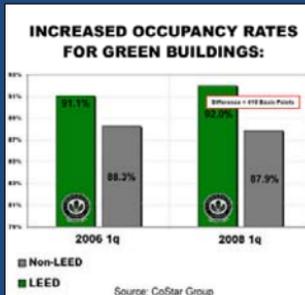
- Green Buildings have:
 - Increased ventilation
 - Comfort control
 - More daylight



Economic Benefits

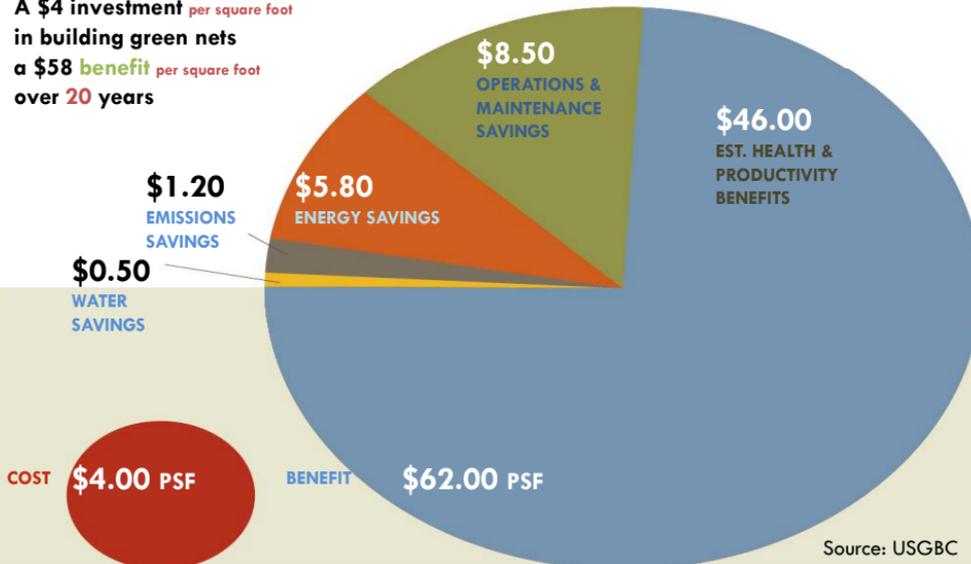
Green buildings achieve:

- Higher rents
- Lower operating and maintenance costs
- Reduced utility bills



Financial Benefits

A \$4 investment per square foot
in building green nets
a \$58 benefit per square foot
over 20 years





LEED for Existing Buildings



LEED Rating System

LEED® for Existing Buildings

Total Possible Points 110***

| | | |
|---|------------------------------|----|
|  | Sustainable Sites | 28 |
|  | Water Efficiency | 10 |
|  | Energy & Atmosphere | 37 |
|  | Materials & Resources | 13 |
|  | Indoor Environmental Quality | 12 |

* Out of a possible 100 points + 10 bonus points

** Certified 40+ points, Silver 50+ points,
Gold 60+ points, Platinum 80+ points

| | | |
|---|----------------------|---|
|  | Innovation in Design | 6 |
|  | Regional Priority | 4 |

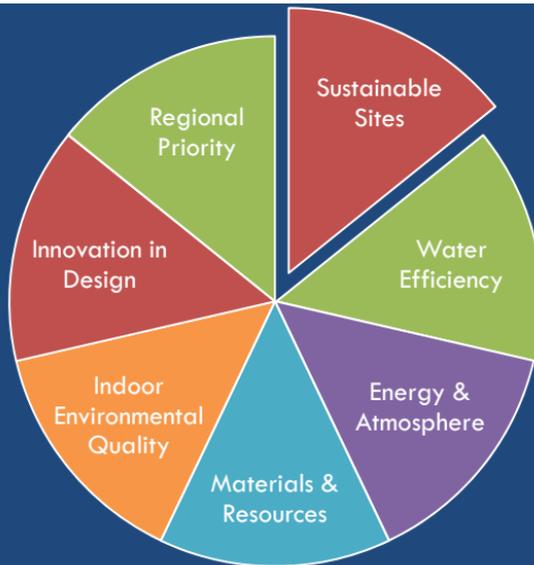


LEED EB Rating System



- Platinum = 80+ points
- Gold = 60+ points
- Silver = 50+ points
- Certified = 40+ points
- Points Possible = 110

LEED Focus Areas



LEED EB Cost Study

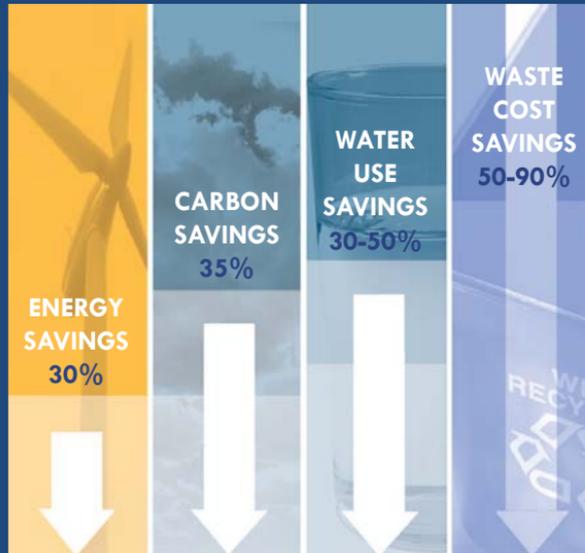
Study of 13 LEED Certified Existing Buildings:
Average upfront cost = \$1 per sq ft

Table 1. Costs of the Implementation & Certification Processes (\$ or hours/square foot)

| | Mean | Median | Minimum | Maximum |
|---------------------------------------|----------|----------|----------|----------|
| All Buildings, n=13 | | | | |
| Staff Hours | 0.013 hr | 0.008 hr | 0.001 hr | 0.041 hr |
| Staff Costs (internal labor) | \$0.588 | \$0.325 | \$0.000 | \$1.779 |
| Consulting Costs | \$0.237 | \$0.041 | \$0.000 | \$1.486 |
| Registration Fee | \$0.018 | \$0.005 | \$0.000 | \$0.100 |
| Application Fee | \$0.010 | \$0.006 | \$0.000 | \$0.041 |
| Other Soft Costs | \$0.005 | \$0.000 | \$0.000 | \$0.056 |
| Total Soft Costs | \$0.86 | \$0.67 | \$0.01 | \$1.89 |
| Total Soft Cost minus internal labor | \$0.27 | \$0.10 | \$0.01 | \$1.54 |
| Total Hard Costs | \$0.73 | \$0.11 | \$0.00 | \$3.14 |
| Total: All Costs | \$1.59 | \$1.52 | \$0.02 | \$5.01 |
| Total: All Costs minus internal labor | \$1.00 | \$0.33 | \$0.01 | \$4.68 |

Source: Leonardo Academy: The Economics of LEED for Existing Buildings; May 29, 2009

Utility Cost Savings



Source: USGBC



Green Strategies



Benchmarking

- Survey existing space
 - Review site: landscaping, stormwater flows, open space
 - Architectural review of interior space
 - Review utility bills
 - Analyze existing systems: HVAC, Lighting, Plumbing
 - Evaluate building envelope
 - Test indoor air quality
- Determine EnergyStar rating
- LEED EB scorecard
- Evaluate maintenance and purchasing policies

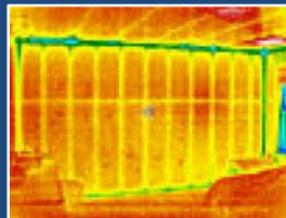
Daylighting / Shading Study

- Shading Devices
- Shade Trees
- Window Film
- Glare Control



Thermal Scanning

- Infrared Building Scan
 - Identify Deficiencies
 - Locate Leaks
 - Upfront cost: Approx \$10K



Retro-Commissioning

- Re-Commission Building Systems
 - Inspect & Repair Dampers
 - Adjust Set-points
 - Calibrate Equipment
 - Review Utility Usage
 - Energy Savings: 2-10%



Measurement and Monitoring

- Survey staff
- Metering & Controls
- Review energy management system data
- Train operations & maintenance staff
- Monitor utility bills



Plumbing Fixtures

□ Inventory Fixtures and Flow Rates

- Faucets
 - 0.5 gpm aerators
- Toilets
 - Replace Flush Valves
- Showerheads
 - 1.75 gpm or less



Roofing Retrofit

- Evaluate Existing Roof
- Increase Insulation
- Install Green Roof
- Replace with White Roof



Policies & Procedures

- Evaluate Sustainability of Policies & Procedures
 - Landscape & Exterior Management
 - Recycling Program
 - Light bulbs, batteries, ink cartridges, etc
 - Telecommuting Options
 - Sustainable Purchasing Practices
 - Ongoing consumables, Durable goods, Facility alterations, Food
 - Solid Waste Reduction
 - Reduce, Reuse, Recycle, Compost
 - Green Cleaning Program
 - Pest Management Plan



Writing Green Policy





Green Building Case Studies



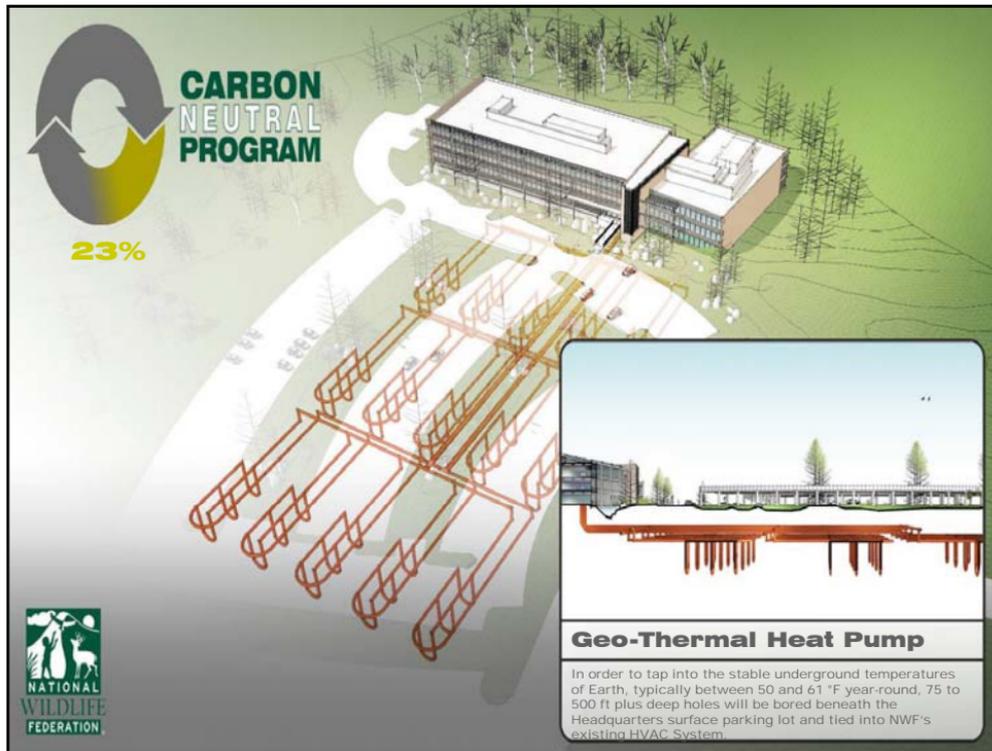
National Wildlife Federation

- Benchmark Review:
 - High efficiency lighting
 - Green procurement practices
 - Extensive green space
 - Bioretention ponds
- Goal:
 - Carbon Neutrality









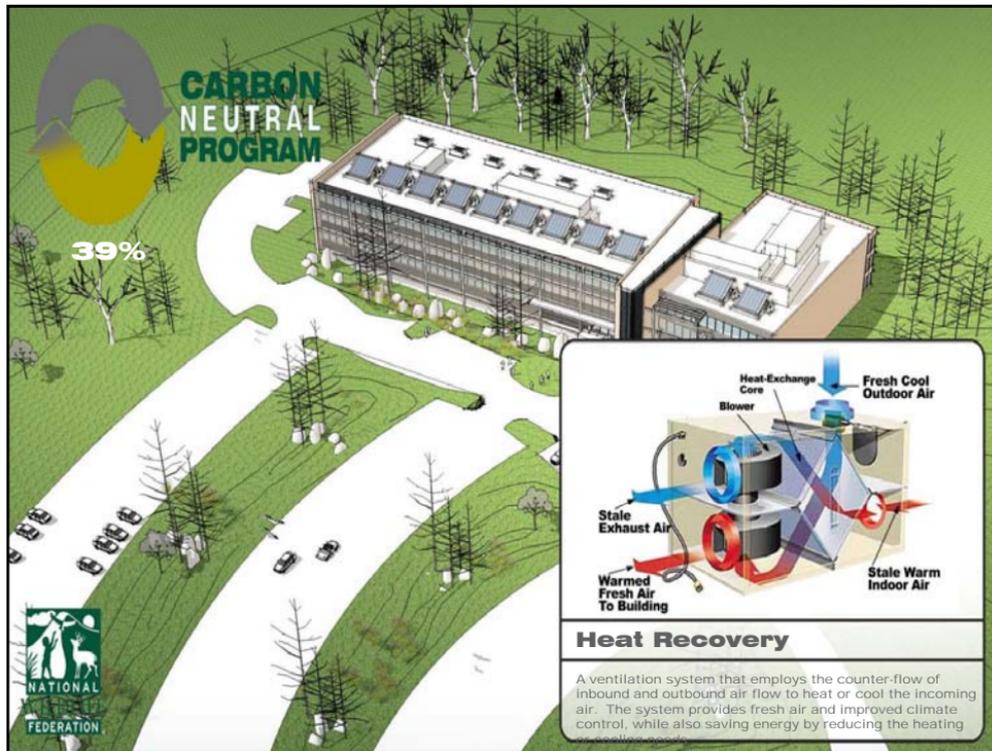










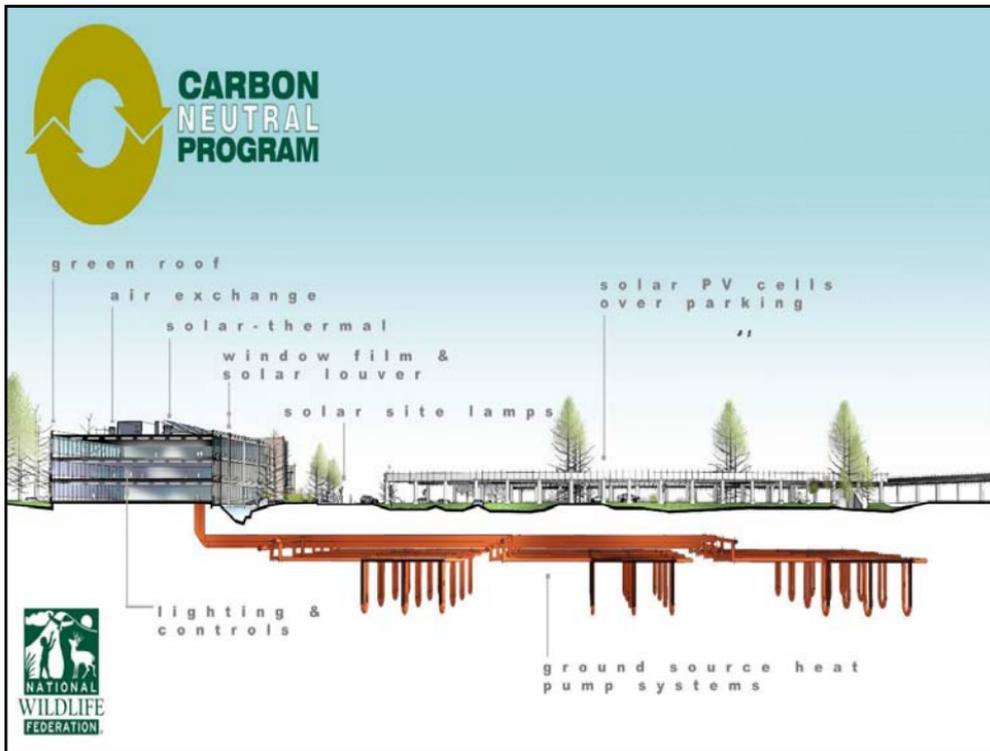












American Society of Civil Engineers

- Targeting LEED Gold
 - Projecting \$35,000 annual utility savings
 - Educational resource for ASCE members
 - Long term plan for equipment upgrades



Figure 1: Basic Facility Benchmarking

Executive Plaza

- Lighting Retrofit
 - Upgrade T-12 to T-5
 - Add Occupancy Sensors
 - Saves 10-14% total energy
 - Payback Period: 1.4 years



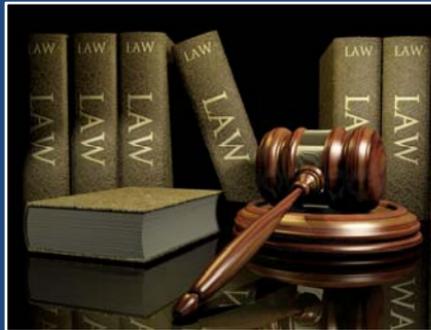
Executive Plaza

- Plumbing Retrofit
 - Low-flow fixtures and faucets
 - Saves 60% water use
 - Payback Period: < 6 months





Government Incentives



Incentive Strategies

□ Tax Credits

- Offset by increased assessed property value

□ Implemented in:

■ Baltimore Co, MD

- Property tax credit for 3 years
- LEED EB Silver = 10%, Gold = 25%, Platinum = 50%

■ Cincinnati, OH

- 100% Property tax exemption up to 12 years
- Rehab projects must be LEED Certified

Incentive Strategies

□ Grant Programs

□ Funded through taxes, fees, state or federal funds

□ Implemented in:

■ State of New York

■ Grant program for renovation of existing homes

■ El Paso, TX

■ Grants up to \$400,000 for LEED EB Platinum

■ Pasadena, CA

■ Pasadena Power & Water offers grants for LEED EB Certification

■ Certified =\$15K, Silver =\$20K, Gold =\$25K, Platinum =\$30K

Incentive Strategies

- Revolving Loan Funds
 - Low interest loan funds are dedicated to green building retrofit projects
 - Repaid at rate less than operational cost savings

 - Implemented in:
 - Cambridge, MA
 - Non-profit Cambridge Energy Alliance allocating \$100 Million for retrofit of city buildings
 - Berkeley, CA
 - Loans for residential PV projects repaid through property tax over 20 years
 - Milwaukee, WI
 - Home energy retrofit loans repaid through utility bills
 - Sonoma County, CA
 - Loans for commercial & residential energy & water efficiency retrofits repaid through property tax assessment



Thank You!

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