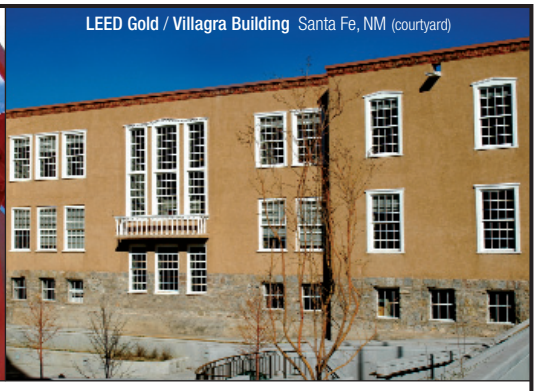
LEED Gold / Villagra Building Santa Fe, NM (street view)

LEED Certified
Baca Dlo'ay azhi Community School
Prewitt, NM



LEED Gold / Villagra Building Santa Fe, NM (courtyard)

How-To Guide to LEED® Certification

for New Mexico Buildings

This LEED Guide is made possible through the **Clean Energy Grant Award** through the Energy Conservation and Management Division (ECMD) of the New Mexico Energy, Minerals and Natural Resources Department.

Electronic version available at **www.cleanenergyNM.org** *and* **chapters.usgbc.org/newmexico**

LEED Silver / PNM IT Office Building Albuquerque, NM

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Preface

The New Mexico Energy, Minerals and Natural Resources Department *Clean Energy Grant Award* program is intended to help provide support and funding for development projects that advance energy efficiency and clean energy in New Mexico state buildings. This Guide was commissioned to educate, encourage, and facilitate LEED Certification for State of New Mexico buildings and demystify the LEED certification process. Utilizing LEED certification may contribute to increased development of clean energy market demand and advance the commercialization and widespread use of renewable energy and energy efficiency in New Mexico buildings.

Ownership, Duplication, Reproduction, and Use of this Guide

Acknowledgements and Thanks

Attorney General ***Patricia Madrid***, Chief Deputy Attorney General ***Stuart Bluestone***, and ***Elizabeth Kupfer***, Administrative Services Director (retired) for the Attorney General, for supporting this Clean Energy Grant both in purpose and with a financial contribution, and for the leadership role shown in pursuing and achieving LEED Gold certification for the Villagra Building.

Valerie Walsh, LEED Management Services, author and contractor of the LEED How-To Guide and grant.

Susie Marbury, Energy Efficiency & Green Building Administrator for the Energy Conservation & Management Division in the Energy, Minerals, and Natural Resources Department, provided tremendous guidance and valuable edits.

Courtney France, France Sustainable Solutions, collaborated on the LEED Application Guide chapter.

New Mexico USGBC Chapter President ***James Wernicke***, past-president ***Howard Kaplan***, and board member ***Lisa Logan*** reviewed the LEED Application Guide. Lisa also contributed to the regional resources chapter. ***Mark Bloomfield*** and ***Erin Gonzales***, LEED Management Services, for their support.

Acknowledgements go out to all whose past contributions have led to this exciting time of accelerated market transformation for sustainable design and construction, and clean and renewable energy technologies.

Let's meet the 2030 Challenge together!

Cover Photo Credits

Baca Dlo'ay azhi Community School photo:
Courtesy of Greg Comer, Dyron Murphy Architects, P.C.

PNM IT Office Building photo:
Courtesy of PNM Resources

Villagra Building photos:
Courtesy of Valerie Walsh, LEED Management Services

Disclaimer

The information contained within the following Guide is intended to support and facilitate the use and application of the USGBC's LEED Rating System for projects seeking recognition of energy and environmental stewardship and verification in the State of New Mexico. This information is provided only as an aid, and is reflective of the author's and reviewers' experience with LEED registered and certified projects. This guide is not comprehensive, and no guarantee of accuracy is implied.

This Guide was developed in February 2007. The LEED Rating System is an evolving tool. Therefore, always consult with the USGBC's most current referenced documents, addendas, erratas, and other updates for the most accurate information for your specific project.

The electronic version is available at **www.cleanenergyNM.org** *and* **chapters.usgbc.org/newmexico**, and the online tutorial *How to Use LEED-Online* and the *USGBC Website for LEED Projects* is found at **www.leedmanagement.com**

TABLE OF CONTENTS

INTRODUCTION

This How-To LEED Guide has been created as a practical resource to make it easier to pursue and successfully achieve LEED certification for building owners and the design and construction community. It is full of the kind of useful information and advice that I wished someone had written before I embarked on my first LEED building project.

There is something for everyone in this LEED Guide, regardless of your level of knowledge or experience in sustainability or LEED.

The Overview tells you why LEED certification makes good business sense.

The LEED Application Guide chapter introduces you to the USGBC and the LEED Green Building Rating System. It then walks you through the entire LEED process, step by step, of what you need to know to pursue LEED certification for your project, offering real-world advice based on combined experience of over 124 LEED projects.

The New Mexico Villagra Building LEED Case Study takes you behind the scenes of a LEED Gold certified project to learn how LEED was achieved for this historic restoration, including its high-performance features.

The Green Resources and Tools Chapter provides regional and national sources to help you find green materials, professionals, construction waste recycling, LEED specification software, RFP sources, organizations, publications, tax credits, and more for your LEED project.

The Top-Ten Tips for First-Time LEED Teams article offers a snapshot of the most basic, yet important steps in a LEED project.

The Online Tutorial shows you how to use LEED-Online, the USGBC web tool, for LEED project documentation, as well as how to navigate the USGBC website for resources central to a LEED project.

On behalf of everyone involved in producing this LEED Guide, we hope that you find it useful in creating more high-performance LEED buildings for New Mexico so we can reduce our energy use, increase the demand and applications for renewable energy, and have LEED certification become standard practice.

OVERVIEW: THE BUSINESS CASE FOR LEED

The U.S. Green Building Council reports that there is over 642 million square feet of LEED registered or certified building space in 2006 that represents a $10 billion annual market. What is significant about those figures is how quickly it has grown, with an eight-fold surge since 2002. Those USGBC figures represent that 2% of all new U.S. commercial construction in 2006 was LEED registered or certified. The 2007 McGraw Hill SmartMarket Report predicts that figure will grow to 5-10% of this market share by 2010.

Barron's, the financial weekly publication from the Wall Street Journal for investors, projects that commercial buildings that don't build or upgrade to LEED standards will soon become obsolete. The primary reason is that LEED buildings have lower operating costs compared to standard buildings. In addition, LEED buildings offer healthier work environments with reported reduced absenteeism, attract and retain more employees, and potentially increase worker productivity.

Even though energy savings can be 30-70% in a LEED building, the larger dollar savings may actually come from employee productivity. A Capital E report claims that even a 1% increase in productivity is worth $3 per square foot annually to an employer.

One study of commissioned buildings[1] shows a median payback of 4.8 years based on costs of $1.00/sf (0.6% of total construction costs) for commissioning alone. The payback is even faster for retro-commissioning of existing buildings, with a nine month return at a median cost of $0.27/sf for an average 18% energy savings[1]. All LEED buildings include Commissioning as a Prerequisite and benefit from operational energy savings.

There are currently over 5,500 registered buildings pursuing LEED certification with over 765 having achieved LEED certification.

Who is doing all this LEED building? All sectors in the industry are represented including large corporations, non-profits and government agencies, developers, school districts, hospitals, universities, retail, and more. Private industry in particular is motivated by the green bottom line and has moved from a first-cost mentality to looking at the bigger picture with life-cycle cost analysis (LCA) and Return-On-Investment data, which LEED performs very favorably on. LEED buildings have been shown to lease faster, even in soft markets, retain higher occupancy rates, and typically appraise higher and receive more favorable financing due to higher net operating income. Fireman's Fund Insurance Co. now offers a 5% discount on insurance premiums for LEED certified buildings.

A tax on building carbon emissions may become a reality one day. LEED certification can contribute to reducing your buildings' carbon footprint and help comply with Governor Richardson's Climate Change Action Plan which calls for reducing greenhouse gas emissions to 2000 levels by 2012, 10% below 2000 levels by 2020, and 75% below by 2050.

New Mexico is one of over 20 states in the U.S. to adopt LEED Silver certification (or LEED standards) for the greening of public buildings. And with the close of the 2007 legislation session, New Mexico now enjoys a new Sustainable Building Tax Credit.

There are more than enough studies[2] available on current LEED buildings to substantiate the increased value, both financially and environmentally, of LEED certified buildings to provide the confidence you need to pursue LEED certification for your next building project. This LEED Guide offers the practical steps to support the process of achieving LEED certification.

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[1] *"The Cost-Effectiveness of Commercial Building Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the U.S.," Evan Mills et al., Lawrence Berkeley National Laboratory, Portland Energy Conservation Inc., and Energy Systems Laboratory – Texas A&M University 15 Dec 2004. http://eetd.lbl.gov/emills/PUBS/Cx-Costs-Benefits.html*

[2] *"Green Buildings and the Bottom Line," Building Design+Construction November 2006 www.BDCnetwork.com*

Chapter 1:

LEED Application Guide

The USGBC, the LEED Rating System, and How to Pursue LEED Certification

LEED APPLICATION GUIDE TABLE OF CONTENTS

LEED APPLICATION GUIDE

PART I: Introductions & Resources

1. Defining Sustainability

As the green building movement gains momentum and value in the industry, numerous organizations have helped to define energy efficient and environmentally responsive buildings, including:

> "An action or thing that does not impair the ability of future generations to achieve and enjoy a way of life comparable to our own." ***~United Nations***
>
> "A building that achieves the specified building performance requirements while minimizing disturbance to and improving the functioning of local, regional and global ecosystems both during and after its construction and specified service life." ***~ASTM***

Whether describing high-performance buildings, sustainable design and construction, or green communities, the movement represents progress towards more efficient operation and increased value in buildings that benefit the occupants and the surrounding environment.

2. Introduction to the U.S. Green Building Council

One organization that has contributed generously to progressing the green building movement is the not-for-profit U.S. Green Building Council (USGBC), based in Washington D.C.

The U.S. Green Building Council is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work[1].

USGBC Chapter Organizations

USGBC chapters, organizing groups, and affiliates provide green building resources, education, and leadership in communities all across the country and help advocate for green building at the local level. Any individual is invited to join a local chapter. USGBC National membership is reserved for companies and organizations, and allows all their full-time employees to enjoy National member benefits. Chapter membership allows any individual, regardless of whether or not his or her company is a member, to participate in the chapter and take advantage of local chapter benefits.

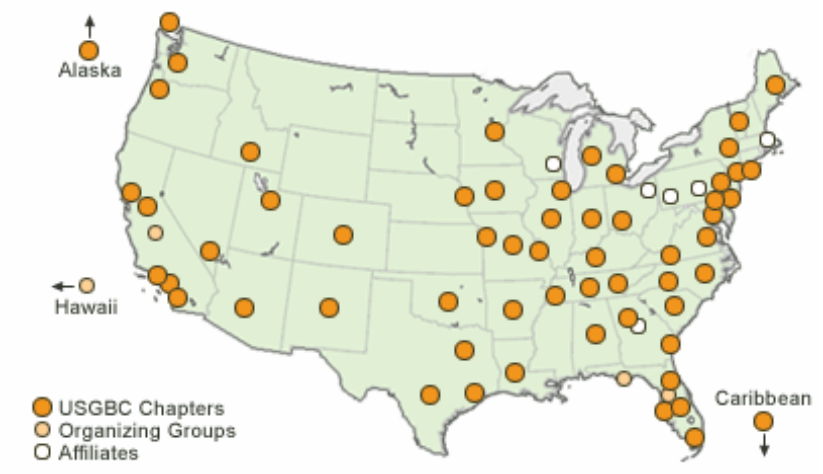


Figure 1: USGBC National Chapters, Organizing Groups, and Affiliates

[1] www.usgbc.org

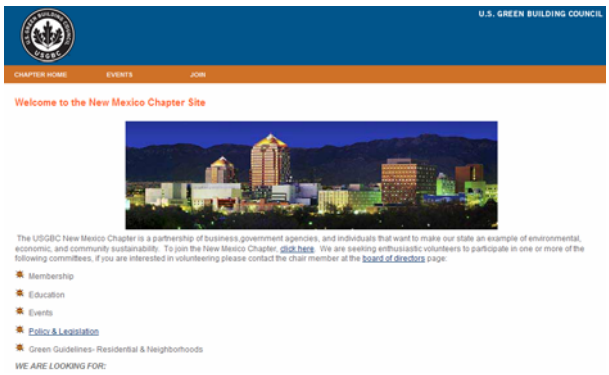


Figure 2: New Mexico USGBC Chapter Website (chapters.usgbc.org/newmexico)

The local New Mexico Chapter is a valuable resource for staying connected to new and exciting developments in the building industry. Visit the link listed in caption.

"The USGBC New Mexico Chapter is a partnership of business, government agencies, and individuals that want to make our state an example of environmental, economic, and community sustainability."

– USGBC NM Chapter

3. Introduction to the LEED Rating System

LEED® stands for Leadership in Energy and Environmental Design. The LEED® Green Building Rating System™ is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Members of the USGBC representing all segments of the building industry developed LEED and continue to contribute to its evolution. The LEED Rating System was developed to:

- Facilitate positive results for the environment, occupant health and financial return
- Educate the building industry and establish guidelines for what constitutes sustainable design practices in the U.S.
- Define "green" by providing a standard for measurement
- Prevent false or exaggerated claims, called "greenwashing"
- Recognize leaders in sustainable building practices
- Stimulate green competition
- Raise consumer awareness
- Transform the marketplace

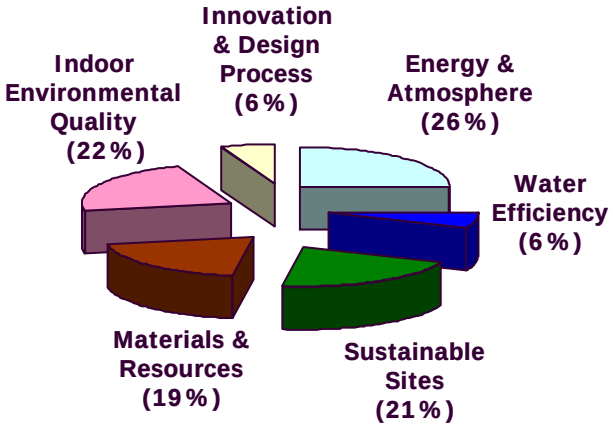
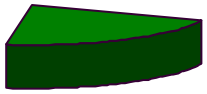


Figure 3: LEED-NC v2.2 Rating System. Categories shown as a percentage of total points out of 69.

LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and handling, and indoor environmental quality. A sixth area for innovation and design encourages project teams to establish their own green criteria.

The main design, construction, and operational categories addressed by the LEED rating system include:

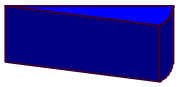
Sustainable Sites (14 pts)



Sustainable Sites

- ✓ Erosion and Sedimentation Control Measures
- ✓ Stormwater Management
- ✓ Site Restoration and Open Space
- ✓ Alternative Transportation Use
- ✓ Dense, urban, transit-oriented community approach
- ✓ Preserving Native Landscape
- ✓ Reduced Heat Island Effect
- ✓ Light Pollution Reduction

Water Efficiency (5 pts)



Water Efficiency

- ✓ Landscape Irrigation
- ✓ Building Water Reuse & other Non-Potable Water uses
- ✓ Water Efficient Flow & Flush Fixtures

Energy & Atmosphere (17 pts)

Energy & Atmosphere

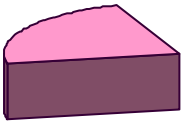
- ✓ Commissioning Building Systems
- ✓ Responsible Refrigerant Management
- ✓ Increased Energy Efficiency
- ✓ Renewable Energy Production
- ✓ Metering, Monitoring, & Building Automation
- ✓ Green Power contributions

Materials & Resources (13 pts)

Materials & Resources

- ✓ Building and Resource Reuse
- ✓ Construction Waste Management
- ✓ Recycled Content
- ✓ Locally Harvested, Processed, and Manufactured
- ✓ Rapidly Renewable Products & Certified Wood

Indoor Environmental Quality (15 pts)



Indoor Environmental Quality

- ✓ Air Quality and Ventilation Effectiveness
- ✓ Environmental Tobacco Smoke Exposure Control
- ✓ Construction Indoor Air Quality Mitigation
- ✓ Low-Emitting Materials & Controlling Chemical Pollutant Sources
- ✓ Controllability of Systems: Lights & Thermal Comfort
- ✓ Daylight & Views for Occupants

Benefits of LEED Certification[2]:

- Recognition of Quality Buildings and Environmental Stewardship
- Third party validation of achievement
- Qualify for growing array of state and local government incentives
- Contribute to growing knowledge base of energy and environmentally responsive buildings
- LEED certification plaque to mount on building
- Receive marketing exposure through USGBC Web site, case studies, media announcements
- Official certificate

Additional reasons to certifying your project with LEED, or participating in other energy efficiency sustainability incentive programs include:

Cost and Grant Opportunities:

- Reduced first costs
- Recognition by local/federal organizations
- Access energy saving performance contract financing, if appropriate
- Access financial incentives through utility sponsored programs
- Tax credits
- Bigger design/construction budget

Occupant Comfort/Employee Satisfaction:

- Indoor air quality & daylighting
- Space planning
- Individual controls & thermal comfort
- Proud employees
- Improve tenant retention and reduce tenant "churn"
- Achieve greater occupant well-being, happiness, and satisfaction

Reduced Absenteeism:

- Save $$ on employee sick days
- Avoid "sick building syndrome"
- Provide a better/healthier place to work

[2] www.usgbc.org

Federal, State, and Local Incentive Programs:

- Tax Credits
- Density Bonuses
- Expedited Permit program and reduced permit fees
- Lower long-term operating costs
- Reduce environmental impact of the building

Mandates from Local / State / Federal Governments:

- Meeting requirements of ruling jurisdictions
- Becoming widespread and well known
- Standard 189 – expected in 2007!

Higher Lease Rates (for Developers) & Marketing Exposure:

- Higher lease rates in some communities
- Faster sell outs
- Better marketing opportunities
- Environmentally conscious tenants
- Recognition in community
- Continued work with premier teams
- National/International exposure

LEED Rating System Product Portfolio

Initially there was only one LEED rating system. It was developed for new construction or major renovation of generic office buildings. As the value and status of LEED grew, the USGBC saw a need to expand and create additional rating systems. This led to the creation of:

LEED-NC	for New Construction and Major Renovation
LEED-EB	for Existing Buildings
LEED-CS	for Core & Shell
LEED-CI	for Commercial Interiors
LEED-H	for Homes
LEED-ND	for Neighborhood Developments

The USGBC has also produced supplemental guides for the LEED-NC Rating System that address different building types and special cases. LEED Application Guides provide specific advice on how to apply LEED in these situations, and describe special exceptions or interpretations. The USGBC's Portfolio of LEED Application Guides is also examined in this section.

Current LEED Rating Systems

LEED – NC (New Construction and Major Renovation) www.usgbc.org/LEED/nc	
History of Development: ▪ Start developing 1995 ▪ Version 1.0 launched 1998 ▪ Version 2.0 (major revisions, released in March 2000) ▪ Version 2.1 (upgrades to v2.0) ▪ Version 2.2 currently in use ▪ Version 3.0 (the future of LEED)	
Applies to:	New & major renovations of commercial, institutional, and high-rise (4+ stories) residential buildings
Who's Using It:	New building owners and users interested in a guide and designation for high-performance commercial and institutional projects, with a focus on office buildings, but also including K-12 schools, institutional facilities, multi-unit residential buildings, manufacturing plants, laboratories and many other building types.

LEED – EB (Existing Buildings) www.usgbc.org/LEED/eb	
History of Development: ▪ Developed 2004 ▪ Version 2.0 currently in use ▪ Credits revised/added/deleted to address facilities managers and maintenance staff related green building issues, like exterior maintenance and whole-building cleaning issues	
Applies to:	Existing buildings focusing on building performance and sustainable operation, including maintenance and upgrades
Who's Using It:	Building owners and operators interested in effective benchmark and verification system for measuring upgrades, improvements and maintenance over the life of a building.
LEED Market Pulse:	An initial sampling of LEED-EB certified buildings found an average return on investment of 2.6 years and annual net savings over $170,000[3].

[3] LEED for Existing Buildngs Informational Brochure

LEED – CI (Commercial Interiors) www.usgbc.org/LEED/ci	
History of Development: ▪ Developed 2004 ▪ Version 2.0 currently in use ▪ Credits revised/added/deleted to address tenant interior design, and construction fit-out scopes, like air quality certified furnishings and tenant efficiency incentive programs	
Applies to:	When project scope includes interior work only, developing inside an existing core & shell building.
Who's Using It:	Tenants and Designers interested in a green benchmark for the tenant improvement market, and may not necessarily have control over whole building operations.
LEED Market Pulse:	Based on recent analysis, the aggregate total return of publicly held companies affiliated with the USGBC outperformed the Dow Jones Industrial Average by over 18% from 2000 to 2004. This may indicate that well-managed, progressive companies are looking to build and operate green as an opportunity to differentiate themselves as leaders in the marketplace[4].

LEED – CS (Core & Shell) www.usgbc.org/LEED/cs	
History of Development: ▪ Developed 2003 ▪ Final Ballot version approved by Members Summer 2006 ▪ Version 2.0 currently in use ▪ Credits revised/added/deleted to address speculative developers with limited scope for future interior tenant ▪ Precertification available! For projects seeking LEED Certification, they can document goals and strategies early in design phases, thus allowing the owner and/or developer the opportunity to market the value of the green features. Only applicable to C&S LEED projects.	
Applies to:	Developers or builders with scope addressing site, structure, envelope, building-level mechanical, electrical, and plumbing systems, and even some limited tenant related building decisions.
Who's Using It:	Designers, Builders, Developers and new building Owners who are interested in addressing sustainable design for new core and shell construction, essentially only including base building elements. Precertification for LEED-CS projects will be used by core and shell building owners and developers interested in the ability to market to potential tenants and financiers the valuable green features proposed in the building before the building's official LEED Certification is awarded.

[4] LEED for Commercial Interiors Informational Brochure

LEED for Neighborhood Development www.usgbc.org/LEED/nd	
History of Development: ▪ Developed 2006 ▪ Pilot LEED-ND program launched 2007 ▪ Final Ballot version anticipated for Members 2008 ▪ Final Version for general use expected 2009 ▪ Credits revised/added/deleted to address smart growth, urbanism, and green building for neighborhood development	
Applies to:	Developers or builders master planning large communities with residential housing and other community-related development.
Who's Using It:	New building Owners, Developers, Community Members, and the General Public interested in the relationship between our communities and a series of public health outcomes such as pedestrian lifestyle and physical activity, traffic accidents, respiratory health and mental health.

LEED for Homes www.usgbc.org/LEED/homes	
History of Development: ▪ Developed 2000 ▪ Pilot LEED for Homes program launched August 2005 ▪ Pilot LEED for Homes Version 1.11a released February 1, 2007 ▪ Credits revised/added/deleted to address single family housing industry	
Applies to:	Developers and builders interested in applying single family sustainable practices to large scale residential developments
Who's Using It:	Homeowners interested in buying or building a LEED home that recognizes and rewards builders for meeting the highest performance standards, and gives homeowners confidence that their home is durable, healthy, and environmentally friendly
LEED Market Pulse: Check the USGBC's LEED for Homes Program Providers that are responsible for selecting appropriate pilot projects and verifying that the homes are built to meet the requirements of the rating system.	

Current LEED Application Guides

LEED – AGMBC (LEED-NC Application Guide for Multiple Buildings and On-Campus Building Projects)
History of Development: ▪ Without developing an entirely new rating system for campus buildings, or multi-buildings on one property, users apply a supplemental guide to the LEED-NC rating system to help explain, or guide, a project to achieve the LEED credit intent based on the unique parameters of campus-type buildings. ▪ Credits revised/added/deleted to address specific requirements associated with buildings where a) several buildings are constructed at once or in phases, or b) a single building is constructed in a setting of existing buildings with common ownership or planning with the ability to share amenities or common design features. ▪ Currently available as the October 2005 'Application Guide' to be utilized on any applicable project seeking LEED v2.1 and v2.2 certification.
Who's Using It: Building Owners and Users interested in applying LEED-NC to projects in a campus or multi-building setting, such as corporate campuses, college campuses, and government multi-building complex installations (i.e. a single owner or common property management and control).

LEED for Retail (LEED-NC Application Guide for Retail)
History of Development: ▪ Retail was originally developed in 2000 as a separate, and unique system ▪ Currently, LEED for Retail is in the LEED Pilot Phase - New Draft of LEED for Retail - New Construction (released February 2007) ▪ Currently accepting Pilot Phase applications ▪ Credits revised/added/deleted to address specific requirements associated with high transient occupant end-use, and other design parameters associated with commercial retail spaces.
Who's Using It: Owners of large chain retail stores, supermarkets, or restaurants, big-box developers, and institutions with multiple buildings that serve large transient customer occupancy loads, like banks and financial centers.

Additional Application Guides under development and expected for release, include:

LEED – Lodging (LEED-NC Application Guide for Lodging)
History of Development: ▪ Currently available as the Copyright 2001 'Application Guide' to be utilized on any applicable project seeking LEED v2.1 and v2.2 certification. ▪ Note: this document has not been balloted by the USGBC membership, and thus is to be used for general guidance only. ▪ Credits revised/added/deleted to address specific requirements associated with buildings that do not comply with the NC requirements for 4+ stories, nor the LEED for Homes, single family housing requirement.
Who's Using It: Building Owners, Developers, Homeowners, Users, or the General Public interested in low-rise lodging projects, such as dormitories, nursing homes, hostels, condominiums, barracks, motels/hotels and apartment buildings that are less than four stories tall.

LEED-NC for Laboratories
History of Development: ▪ EPA's Labs for the 21st Century contributed to developing this rating system supplement ▪ Credits revised/added/deleted to address specific requirements associated with laboratory and/or medical facilities with unique energy, operation, and safety requirements, including ventilation issues and process loads ▪ Application Guide under development. Draft for public review expected in 2007.
Who's Using It: Building Owners, Developers, and Users, interested in laboratory, or high-energy intensive, operational new facilities, including federal government national research laboratories.

LEED-NC for Schools
History of Development: ▪ CHPS (California High Performance Schools) program contributed to developing this rating system supplement ▪ Credits revised/added/deleted to address specific requirements associated K-12 educational school facilities like, student transportation, occupancy definition, and classroom acoustics ▪ Application Guide under development.
Who's Using It: For use by any K-12 school system or district, school designers, architects, owners, builders.

LEED-NC for Healthcare	
History of Development:	▪ American Society of Healthcare Engineers Association's (ASHEA's) Green Guidelines for Healthcare (GGHC) contributed to developing this rating system supplement ▪ Credits revised/added/deleted to address specific requirements associated with laboratory and/or medical facilities with unique energy, operation, and safety requirements, including chemical sensitivity issues and process loads ▪ Application Guide under development. Draft for public review expected in 2007 or 2008.
Who's Using It:	Building Owners, Developers, and Users, interested in laboratory, or high-energy intensive, medical or healthcare oriented facilities.

As LEED continues to evolve, the USGBC is looking at consolidating all of the above rating systems and application guides into a menu-driven system that will be tailored to each project. This consolidated system will also incorporate regional, life-cycle costing (LCA), and carbon emission overlays.

LEED Checklist

The LEED Checklist, also referred to as the LEED scorecard, is used to track and document a project's success toward achieving compliance for mandatory prerequisites and desired credits. We recommend completing the first LEED scorecard *as early as possible* for any development project. This may be considered the 'LEED feasibility scorecard'.

After each major design iteration, the project's LEED scorecard should be revised to reflect any new information and documentation represented by the sustainable strategies in the contract documents.

The following example LEED-NC scorecard is shown (refer to Figure 4, next page) to demonstrate the credit break-out, and tracking columns to show various degrees of credit pursuit.

- Credits in the "Yes" column are those that have been determined to be readily achievable with design integration and appropriate documentation.
- Credits in the "Maybe" (?) column are those that the current design solution does not preclude, but calculations and further analysis will need to be done by the Design Team to determine if the credits are feasible.
- Credits in the "No" column are either precluded by the site, building type, or design solution, or have been determined not practical or desirable for your project.

LEED for New Construction v2.2
Registered Project Checklist

Project Name:
Project Address:

Yes	?	No			
8	4	2		**Sustainable Sites**	**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
	1		Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
	1		Credit 5.1	**Site Development,** Protect of Restore Habitat	1
1			Credit 5.2	**Site Development,** Maximize Open Space	1
		1	Credit 6.1	**Stormwater Design,** Quantity Control	1
	1		Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
	1		Credit 8	**Light Pollution Reduction**	1
Yes	?	No			
3	1	1		**Water Efficiency**	5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1
Yes	?	No			
3	2	0		**Innovation & Design Process**	5 Points
1			Credit 1.1	**Innovation**: Green Housekeeping Policy	1
1			Credit 1.2	**Innovation**: WEc3 Water Use Reduction - Exceedance (40% reduction)	1
	1		Credit 1.3	**Innovation in Design**: Educational Outreach Program	1
	1		Credit 1.4	**Innovation in Design**: Other	1
1			Credit 2	**LEED® Accredited Professional**	1
Yes	?	No			
28	6	35		**Project Totals** (pre-certification estimates)	69 Points

Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points

Figure 4: LEED-NC v2.2 Scorecard – beginning and end portions shown here, including total score thresholds for achieving LEED-NC certification levels

Points are documented from the LEED categories to ultimately apply and achieve the targeted certification award level – Certified, Silver, Gold, or Platinum.

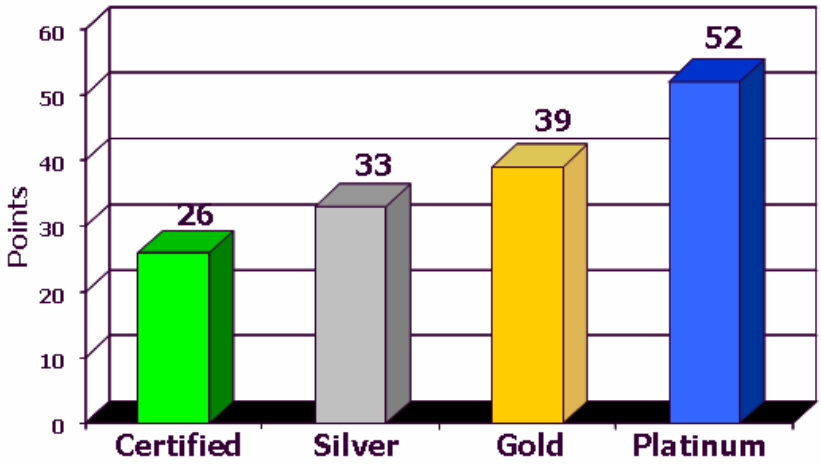


Figure 5: LEED-NC v2.2 Certification Levels – Certified, Silver, Gold and Platinum minimum point thresholds

4. LEED Resources

Navigating any new requirements, including LEED documentation, can be challenging for project teams. In order to effectively, and efficiently, manage the LEED certification process, team members must be aware of the tools and resources available, starting with:

- USGBC Website (www.usgbc.org)
- LEED-NC v2.2 Reference Guide (http://www.usgbc.org/DisplayPage.aspx?CMSPageID=220#v2.2)
- Local New Mexico USGBC Chapter (http://chapters.usgbc.org/newmexico/)
- LEED-Online Video Tutorial (http://www.leedmanagement.com/)
- Local New Mexico LEED Certified Projects (http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx?CMSPageID=244&CategoryID=19&)
- LEED Accredited Professionals[5] – responsible party to help guide the project through LEED Certification (http://www.usgbc.org/LEED/AP/ViewAll.aspx?CategoryID=1306&CMSPageID=1585)

These resources are examined in further detail in the following sections.

[5]As defined by the USGBC, LEED Accredited Professionals (LEED AP's) are recognized and credited individuals that demonstrate a competent knowledge of sustainable building practices, the LEED rating system, and, the registration, certification, and LEED-Online administrative management of the project's LEED application.

Figure 6: New Mexico LEED Certified projects by location (as of 2/07).

USGBC Website

Refer to Figure 7 below for the following USGBC's web resources:

1. *USGBC Homepage* – updated continually, often features latest news and newly released studies or sustainable programs (www.usgbc.org).
2. *'Your Account'* – enter user profile information, including company name, contact information, and, if your company is a USGBC member, their member ID code.
3. *'CHAPTERS'* – check out the New Mexico Chapter website here, and other chapters too! Chapters from other regions have resources that are often applicable to your projects and examples to implement in your own region.
4. *'RESOURCES'* – USGBC Member companies have access to more information on this weblink. Be sure your 'User Profile' includes your USGBC Company ID code in order to have login access privilege to the 'Member-Only Resources'.
5. *'LEED'* – the main resource for all LEED Rating Systems and basic information for use by members and non-members. A link to LEED-Online can be accessed here.
6. LEED-Online – the direct link to LEED-Online is http://leedonline.usgbc.org, for registered project access to the online LEED Certification documentation website.

The electronic version of this How-To LEED Guide for New Mexico Buildings includes an online tutorial for using both LEED-Online and the USGBC website. Reference http://www.cleanenergynm.org/ or http://chapters.usgbc.org/newmexico/ for the electronic version of this LEED Guide. For just the online tutorial, reference www.leedmanagement.com.

Figure 7: U.S. Green Building Council website resources (www.usgbc.org)

LEED Reference Guide

This is the essential 'user's manual' for applying the LEED Rating System to your project. Every project team should have one or more LEED Reference Guides for key members, applicable to the rating system the project is pursuing (NC, EB, CI, CS, etc.).

The LEED for New Construction Version 2.2 Reference Guide contains over 400 pages of advice and information on using the rating system for your building project. Your purchase of this guide from the USGBC also includes online access to full versions of the 2.2 and 2.1 reference guides (nonprintable PDF files). Errata sheets are corrections to the LEED Reference Guides, and are posted on the USGBC website.

For each credit, the Reference Guide provides the following information:

- Overview and points per credit
- Documentation requirements
- Summary of referenced standard (where applicable)
- Importance and benefits of compliance
- Recommended design strategies and technologies
- Potential design synergies and trade-offs
- Economics (when available)
- Calculation methods and formulas
- Resources and definitions
- Case study (when available)

Figure 8: LEED Reference Guide manuals for LEED-NC v2.2 and LEED-CS v2.0

USGBC New Mexico Chapter

(http://chapters.usgbc.org/newmexico/)

The local USGBC New Mexico Chapter is an active and growing community of building professionals and advocates of sustainable building practices. With all the new development on the horizon in New Mexico, issues like water conservation, proposed power plant construction, and renewable energy expansion, will require local attention and the chapter will provide valuable resources to the community.

Try participating in the local NM Chapter's monthly luncheon meetings in Albuquerque. Featuring informational presentations, these meetings are open to the public as well as chapter members. Times and places can be found on the chapter's website http:chapters.usgbc.org/newmexico. The local chapter offers the opportunity to:

- Meet and collaborate with companies, firms, and organizations that are experienced and qualified in green building development
- Learn more about sustainable building design and construction practices through continued education and lecture seminars
- Stay informed about local and state environmental concerns, debates, rallies, legislative activity and programs.

Refer to the Green Resources & Tools section in Chapter 3 of this LEED Guide for more information and details related to joining your local USGBC New Mexico Chapter.

New Mexico LEED Certified & Registered Projects

Local LEED Certified, and even LEED Registered projects in the process of applying for Certification, are great resources for learning more about how to apply specific sustainable strategies to your project. As of February 2007, there are thirty-eight LEED registered New Mexico projects. Two of the three New Mexico certified projects have published LEED case studies. The Baca/Dlo'ay azhi Community School can be found at http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=387. The New Mexico Villagra Building case study is included in this Guidebook, which can also be found at http://www.cleanenergynm.org/ and http://chapters.usgbc.org/newmexico/. The following are the three LEED certified buildings in New Mexico as of February 2007:

Project Name	Location	Owner	Date of Award	LEED Rating & Award
Baca/Dlo'ay azhi Community School	Prewitt, NM	Baca Community School	January 2004	LEED-NC v2.0/2.1 Certified
IT Office Building	Albuquerque, NM	PNM	August 2006	LEED-NC v2.0/2.1 Silver
New Mexico Villagra Building	Santa Fe, NM	New Mexico General Services Department	October 2006	LEED-CI v2.0 Gold

Figure 9: New Mexico LEED Certified projects, as of February 2007

Visit the USGBC website to find the most current list of LEED Certified and Registered projects in New Mexico.

Although only 3 projects in New Mexico have received certification at the time of publication for this Guide, many more projects are expected to receive formal LEED certification from the USGBC in the future. Several governmental initiatives are promoting LEED to green our state's buildings.

- An Executive Order for high performance energy efficient green building standards, signed by New Mexico Governor Bill Richardson in January 2006, adopts LEED as the certification standard for state-owned building projects.
- As of July 2007, New Mexico will implement a Sustainable Building Tax Credit for both commercial and residential buildings that meet specific LEED and energy efficiency requirements.
- The City of Albuquerque and Los Alamos County have also adopted LEED for their building requirements.

Visit http://www.cleanenergynm.org/ and http://cabq.gov/sustainability/ for more information on how the adoption of green building standards, and the requirements for LEED certification, affect your New Mexico project.

Figure 10: The Baca Dlo'ay azhi Community School, located in Prewitt, New Mexico, was the first building in the state to receive LEED certification. The building earned a rating of LEED Certified in January 2004.

LEED Accredited Professional (LEED AP)

The USGBC's LEED Professional Accreditation identifies building professionals that have successfully completed an examination showing knowledge and skills in green building practices and the LEED certification process.

- LEED APs positively contribute to a project's success by:
- Earn a project 1 point towards LEED Certification
- Strengthens a project team's qualifications when responding to Requests For Proposals (RFPs)
- Promotes higher understanding of LEED and supports USGBC's mission to transform the built environment

LEED APs positively contribute to a professional or company's value by:

- Marketable credential to employer or client
- USGBC Website marketing/exposure
- Professional Certificate & title
- Increase eligibility for projects and owners

As of February 2007, the USGBC recognized over 35,000 LEED APs in the building industry. It is important to understand that, although LEED APs have demonstrated expertise in green building practices, other skills such as project management, integrated design concepts, and facilitation are also important to successfully administer, manage, and complete the LEED certification process.

If you are interested in becoming a LEED AP, learn more from the USGBC's website, https://www.usgbc.org/DisplayPage.aspx?CategoryID=1306.

New Mexico currently has four USGBC LEED AP Exam Testing Sites located at the following THOMSON PROMETRIC Test Centers:

4121 Wyoming Blvd NE
Albuquerque, NM 87111
Phone: (505)296-0609
Site Code: 1900

3291 Del Ray Blvd., Suite 4
Las Cruces, NM 88012
Phone: 505-382-4442
Site Code: 5183

3311 Candelaria Drive NE, Suite C-1
Albuquerque, NM 87107
Phone: 505-881-5359
Site Code: 5167

2538 Camino Entrada, Suite 204
Santa Fe, NM 87507
Phone: 505-473-9415
Site Code: 5184

PART II: APPLYING LEED TO YOUR PROJECT

The success of LEED is dependent upon early integration of sustainable strategies, collaboration from all disciplines of the project team, and clear, tracked progress of achieving the LEED criteria desired for your project.

EARLY INTEGRATION = LEED SUCCESS

The following section includes information on how to successfully pursue LEED certification for any New Mexico building.

5. Sustainable Project Kick-Off Using LEED

Applying LEED early in a project can be achieved by the following methods:

Integrated Design – This is a project delivery method that involves as many stakeholders in the project, as early as possible. It uses a collaborative design/build approach for incorporating constructability, cost effectiveness, and sustainable performance criteria into the project design. In essence, LEED is an integral part of the original program, rather than a separate requirement added to the project.

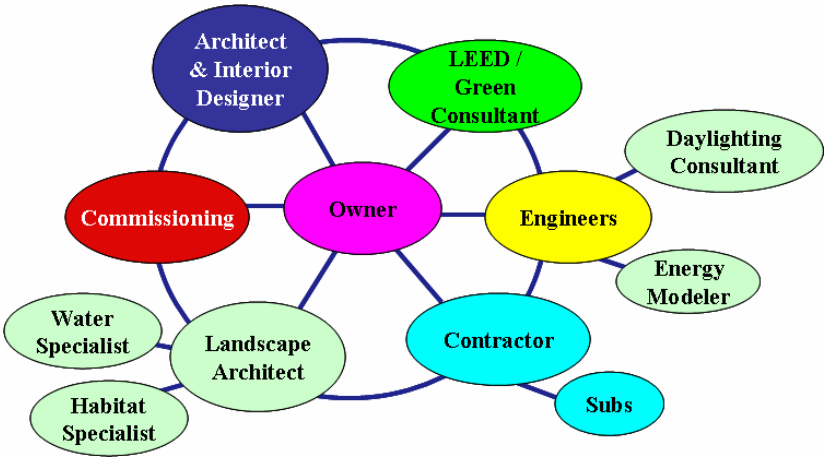


Figure 11: Integrated Team Project Delivery Method – Design and Construction Team members join the project together early and work as a group to meet the owner's needs and requirements

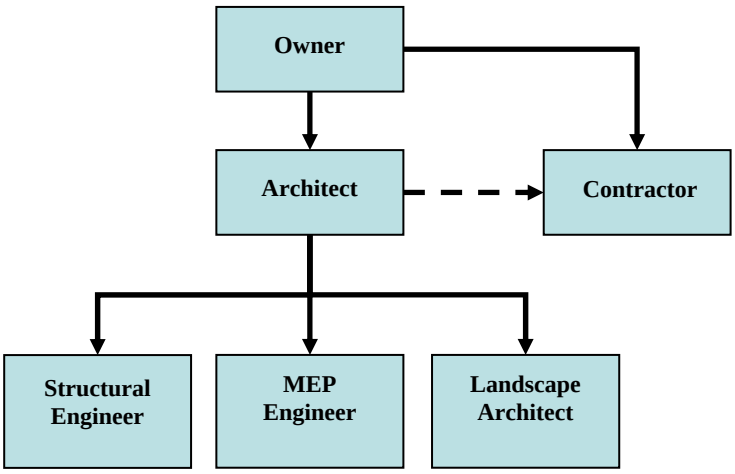


Figure 12: Traditional Project Team Delivery Methods - Architect leads the design, and the Contractor joins after the design is complete. The team typically works individually, instead of collaboratively.

Bringing the project team together early in the process will lead to a project that can meet more of the owner's expectations, within the project constraints, including budget, schedule, and scope.

To ensure a successful LEED project, it is important that your project team is knowledgeable about applying LEED to the design, engineering, construction, and consulting disciplines.

The following questions will help you assess potential LEED project team participants' LEED qualifications. Keep in mind that these questions apply to the ideal candidate or firm. These features may be a good list of goals to aspire to as most design and construction professionals in New Mexico have not participated in a LEED project as of February 2007.

1. How familiar are your firm's expected team members with the LEED Rating System and the formal certification process?
2. Has your firm ever participated on a project seeking LEED, or that has achieved LEED certification? If so, what project(s)? What level was sought or awarded? Describe your role or responsibilities related to LEED on the project.
3. Has your firm participated in, or used, the LEED-Online submittal documentation web process?
4. Can you list the typical LEED credits directly related to your scope of services? Describe your participating role in achieving any of these listed credits or prerequisites.
5. Are additional fees associated with LEED research, documentation, or submission included in your proposal fee? If so, please itemize.
6. If additional codes, or standards, are utilized for LEED compliance, above those specified by local code or jurisdiction, are the fees associated with showing this compliance included in your proposed fees? If so, please itemize.
7. Do you have any additional coordination meetings for LEED in your proposed budget? If so, please itemize.
8. Do you have LEED APs on staff who will actively participate in this project? If so, please specify.

If after this assessment, you determine that you don't have a team assembled with the required expertise, the owner will have to pay a qualified LEED consultant above and beyond the fee for LEED project management, to provide the necessary training to assure that all team members are well prepared to play their role in the LEED project.

- *Design Charrettes* – A charrette is usually a one to four day workshop that engages all stakeholders in the early design process. Charrettes are great for an early project kick-off meeting to initiate the collaborative process and establish the project's goals, including programming, budget, and scope. The goals should reflect the owner's mission.

Figure 13: Project team members collaborating on a project design and site logistics

LEED credit synergies or opportunities for single design strategies to mutually benefit achieving 2 or more credit points, are often identified during a project's design charrette. For example, applying a garden roof system to the design can help reduce urban heat island effects, save building energy costs, and also, reduce the amount of stormwater that leaves the site, thus aiding the civil engineer's stormwater management design development.

- *Establish Environmental Goals* – As part of a project's early charrette, the environmental goals must be prioritized. The sustainable issues, such as energy efficiency, water conservation, indoor air quality, community connectivity, solar and wind harvesting, et cetera, must be considered within project constraints like budget, schedule, comparable lease rates, et cetera.
- *Prerequisite Compliance* – Confirm the project can meet the LEED Certification Prerequisites and associated referenced standards.
  - LEED projects must comply with *ALL* Prerequisites in the LEED Rating System being applied to that project. Prerequisites are NOT elective. Prerequisites do not contribute to points.
  - Several LEED Prerequisites reference building design standards for compliance, which must be confirmed EARLY in the design process.
- *Preliminary LEED Scorecard* – Establish the project's baseline LEED Scorecard as soon as possible. Use this baseline LEED Scorecard for further revisions related to design development and cost analysis information. Task responsible parties to preliminary feasibility studies for unknown, or "Maybe", credits.
- *Costing LEED* – Avoid placemarker percentage premiums for LEED, such as looking only at first-cost premiums without considering the potential returns and long-term benefits. This is often a common error in understanding the true cost additions associated with incorporating LEED Certification requirements into the project scope.

A LEED certified building is a high performance building. Not only does that mean it is gentler on the environment, it also provides a higher quality space for building occupants, costs less to operate and maintain, and enjoys a higher market value than other buildings. The old adage 'you get what you pay for' is appropriate for this discussion. The costs associated with LEED must be balanced against the benefits. Additionally, using life-cycle cost analyses, premium costs can often be limited to those that have the most effective return.

A successful LEED project will have some specialty design professionals involved that results in higher upfront design costs but the overall cost of the project may not necessarily be higher. Expect to have fees specific to LEED for energy modeling and analysis, the LEED Project Manager or Consultant, and perhaps daylighting design. These costs can typically be recouped on the construction and operation side with, for example, a reduced HVAC system, reduced energy use and operating costs, tax incentives, quicker leasability and less tenant turnover, LCA, amongst others.

- ✓ *First* – Understand Baseline Scope & Budget. Ideally, this should reflect the goals established at the kick-off charrette.
- ✓ *Second* – If your project has a predetermined budget that does not include all of the LEED scope, it will be necessary to demonstrate the cost-effectiveness of the strategies selected to achieve LEED.
- ✓ *Third* – Assign costs (design soft costs & construction hard costs) to any strategies that are above and beyond the baseline scope and budget. (Reference Figures 13 & 14)
- ✓ *Fourth* – Include budget for 3rd party consultants necessary to comply with specific LEED credits and prerequisites (Commissioning Agent, Energy Modeler, LEED Coordinator, etc.) Although commissioning is a LEED requirement, it is also considered good building practices and the costs should be part of the basic budget.
- ✓ *Lastly* – Consider payback, rebates, incentives, and operational cost savings related to these strategies to confirm that life cycle assessment makes design and/or construction practice a feasible approach.

LEED-NC Version 2.2 Registered Project Checklist - Cost & Benefit Analysis
Project Name
City, New Mexico

Yes ? No

					Sustainable Sites	Hard Cost	Soft Cost	Payback/Incentive
Y			Prereq 1	**Construction Activity Pollution Prevention**	required by local permitting, baseline design	Civil Engineer completes LEED submittal $150	Code compliance (risk management), minimize penalty fees from EPA
x			Credit 1	**Site Selection**	owner's site selected, $0 to project	Owner completes LEED submittal docs $0	Preserving community spaces, easier approval for land use permitting.
x			Credit 2	**Development Density & Community Connectivity**	owner's site selected, $0 to project	Architect researches & identifies 10 services & res. density qualifying for credit; prepares site map & completes LEED submittal docs, $400	Faster leasing (higher lease rates) in suburban, sites close to ammenities
		x	Credit 3	**Brownfield Redevelopment**	site does not qualify	N/A	Reduced owner/developer purchase price for sites requiring remediation
x			Credit 4.1	**Alternative Transportation**, Public Transportation Access	Bus lines near site location, $0 to project	Architect researches transit lines, routes, & distances; prepares map; completes LEED submittal docs $150	Employees commute via mass transit, reduces need for parking, cost savings.
	x		Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	# Bike Racks= X$ #Showers = X$	Architect calculates FTE for showers & bikes in SD or earlier; completes LEED submittal $250.	Employee incentive/ammenity - recruiting advantage for healthy bike-commuting employees
x			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	# Hybrid Parking Stalls = X$ for signage	Architect designs for Hybrid Parking stalls w/ signage spec; no addt'l cost; completes LEED submittal $200	Marketing value for public image and visual representation of promotion of fuel efficient vehicles
		x	Credit 4.4	**Alternative Transportation**, Parking Capacity	Including additional parking, exceeding minimum local code	N/A	Reduced parking would provide cost savings to project budget.

Figure 14 : Example Project LEED Scorecard with detailed Hard Construction Cost and Soft Design Fees listed with each targeted credit to demonstrate the level of detail to estimate LEED costs.

Yes	Maybe	No	Sustainable Sites	14 Points Possible	Relative Cost
			Prereq 1	**Construction Activity Pollution Prevention**	Included in Project
			Credit 1	**Site Selection**	Included in Project
			Credit 2	**Development Density & Community Connectivity**	Further Analysis / Calcs
			Credit 3	**Brownfield Redevelopment**	Not Applicable
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	Included in Project
			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	Bike Racks = $, Showers = $$
			Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	Parking Stalls = 0 - $

Figure 15: A simpler example of a Project's LEED Scorecard with relative costs itemized for each targeted credit

There is no hard, fast rule for estimating the cost of LEED for your project. LEED is very project-specific. You must first apply the sustainable credit requirements to your project, and determine how they impact the baseline scope and budget.

Numerous studies, case examples, and independent research have been conducted and documented regarding the associated costs for LEED certification. Although these resources may be valuable in guiding your project in the early design phases, be aware that local market conditions, qualifications of the bidding community, and even local incentive programs can dramatically alter a project's LEED Scorecard and associated costs.

For additional cost studies related to LEED Certified projects, refer to the following:

- Green Buildings and the Bottom Line, Building Design+Construction November 2006 White Paper Supplement, http://www.bdcnetwork.com/contents/pdfs/whitepaper06.pdf
- Greening the Building and the Bottom Line, Rocky Mountain Institute, http://www.rmi.org/images/other/GDS/D94-27_GBBL.pdf
- United States Green Building Council Website, www.usgbc.org Go to 'Resources > Research > Economic Analysis' posted cost reports and studies
- Costing Green: A Comprehensive Cost Database & Budgeting Methodology, Davis Langdon http://www.usgbc.org/Docs/Resources/Cost_of_Green_Full.pdf#search=%27Costing%20Green:%2Davis%20Langdon
- LEED Cost Study, General Services Administration http://www.wbdg.org/newsevents/news_040105.php
- The Costs and Financial Benefits of Green Buildings, Capital E & LBNL http://www.usgbc.org/Docs/Resources/CA_report_GBbenefits.pdf
- Greening America's Schools: Costs and Benefits, Greg Kats (October 2006)

'Costing LEED' must be carefully defined for a project. Instead of approaching cost on a first-cost only basis, consider the payback, marketing value, life-cycle return on investment, and incentives, like expedited permits or development density bonuses.

Mechanical systems, and building envelope systems, are often considered for life-cycle analysis in order to determine the optimal design, based on longer term value to the building owner and/or tenant. Cost benefit analyses can be conducted qualitatively, like the spreadsheet below, simply adding a column to identify the potential payback or incentive from investing in particular sustainable strategies for the project.

LEED-NC Version 2.2 Registered Project Checklist - Cost & Benefit Analysis

Project Name
City, New Mexico

LEED-NC

Yes	?	No			Sustainable Sites	Hard Cost	Soft Cost	Payback/Incentive
	1							
Y			Prereq 1	**Construction Activity Pollution Prevention**	required by local permitting, baseline design	Civil Engineer completes LEED submittal $150	Code compliance (risk management), minimize penalty fees from EPA
x			Credit 1	**Site Selection**	owner's site selected, $0 to project	Owner completes LEED submittal docs $0	Preserving community spaces, easier approval for land use permitting.
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		x	Credit 3	**Brownfield Redevelopment**	site does not qualify	N/A	Reduced owner/developer purchase price for sites requiring remediation
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	x		Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	# Bike Racks = X$ #Showers = X$	Architect calculates FTE for showers & bikes in SD or earlier; completes LEED submittal $250.	Employee incentive/ammenity - recruiting advantage for healthy bike-commuting employees
x			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	# Hybrid Parking Stalls = X$ for signage	Architect designs for Hybrid Parking stalls w/ signage spec; no addt'l cost; completes LEED submittal $200	Marketing value for public image and visual representation of promotion of fuel efficient vehicles
		x	Credit 4.4	**Alternative Transportation**, Parking Capacity	Including additional parking, exceeding minimum local code	N/A	Reduced parking would provide cost savings to project budget.

Figure 16: Example Project LEED Scorecard with Payback, or Incentives, listed with each targeted credit

Quantitative analyses can be done using actual increased costs and calculating the present value of future savings.

In addition to costs associated with achieving credits, a project will be required to pay registration & certification fees to USGBC. As of February 2007 registration and certification fees range from $2,200 for a building under 50,000 square feet to $17,950 for a building over 500,000 square feet. The certification fee alone for buildings in the mid-size range is calculated on a cost per square foot basis, but the $450 registration fee remains the same.

Visit the USGBC website for fees associated with your project's LEED registration and certification, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=65&.

6. LEED Certification

After the preliminary LEED feasibility cost-benefit analysis is complete for a project, and the formal policy decision, or contract requirement, to pursue formal LEED Certification is defined, the process of LEED Certification management begins. The following steps outline the procedural registration, application management, and certification tools used to apply the LEED rating system to your project:

LEED Project Registration & Application Management

Refer to the USGBC website narrated video tutorial at http://www.leedmanagement.com/ for more detail on the LEED Registration and Certification management processes described below.

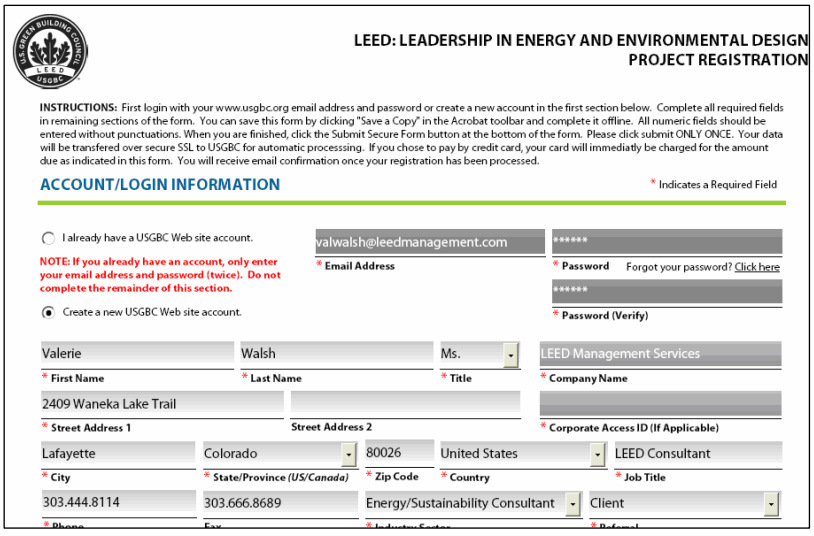
Project registration is completed via the USGBC website, and includes the following basic information:

- Project Team Contact Information
- Owner Information
- Project Information & Details
- Payment Information

Go to www.usgbc.org to register your project with the online application for electronic or fax submission.

**Reminder* – you must pay for the project's LEED Registration Fee at the time of registration.

**Reminder* – make sure the Project Team's USGBC member company registers the project online, to receive the discounted USGBC member Registration Fee.



LEED: LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN
PROJECT REGISTRATION

INSTRUCTIONS: First login with your www.usgbc.org email address and password or create a new account in the first section below. Complete all required fields in remaining sections of the form. You can save this form by clicking "Save a Copy" in the Acrobat toolbar and complete it offline. All numeric fields should be entered without punctuations. When you are finished, click the Submit Secure Form button at the bottom of the form. Please click submit ONLY ONCE. Your data will be transfered over secure SSL to USGBC for automatic processsing. If you chose to pay by credit card, your card will immediatly be charged for the amount due as indicated in this form. You will receive email confirmation once your registration has been processed.

ACCOUNT/LOGIN INFORMATION * Indicates a Required Field

I already have a USGBC Web site account.
NOTE: If you already have an account, only enter your email address and password (twice). Do not complete the remainder of this section.
Create a new USGBC Web site account.

valwalsh@leedmanagement.com — * Email Address
****** — * Password — Forgot your password? Click here
****** — * Password (Verify)

Valerie — * First Name
Walsh — * Last Name
Ms. — * Title
LEED Management Services — * Company Name
2409 Waneka Lake Trail — * Street Address 1
Street Address 2
* Corporate Access ID (If Applicable)
Lafayette — * City
Colorado — * State/Province (US/Canada)
80026 — * Zip Code
United States — * Country
LEED Consultant — * Job Title
303.444.8114 — * Phone
303.666.8689 — Fax
Energy/Sustainability Consultant — * Industry Sector
Client — * Referral

Figure 17: LEED-Online Project Registration Form – partially shown here

LEED Management Certification Process Overview

Upon registering your project, the general overview of the LEED certification process includes:

1. Setting the project up on LEED-Online (see further detail in the LEED-Online section below), including assigning responsible parties for tracking credits pursued
2. Assisting the Design Team to develop an energy and environmentally responsive design in compliance with LEED criteria
3. Assisting the Construction Team to comply with applicable LEED criteria
4. Preparing required documentation – LEED-Online submittal templates plus needed substantiation documentation or calculations
5. Submitting application with required documentation, including the certification fee
6. Responding to USGBC review comments
7. Notifying team members of LEED rating received (Certificate & Plaque)

LEED Schedule Integration—Design and Construction Phase

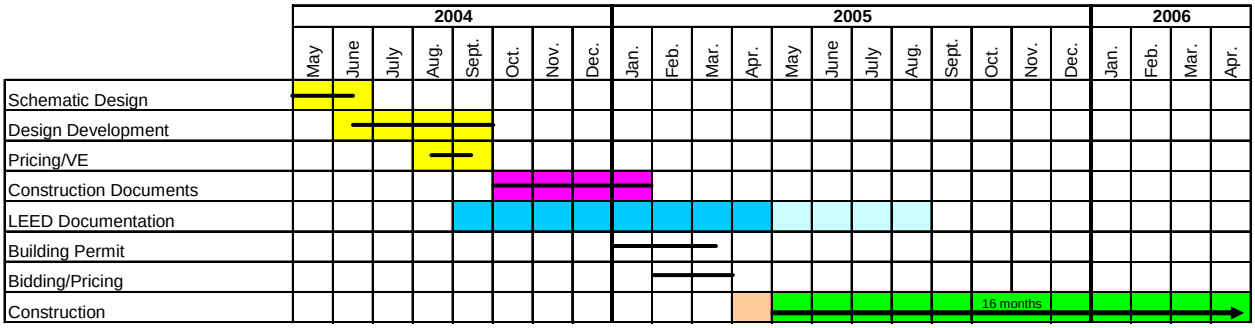
The USGBC's review process for certifying projects has evolved throughout the various LEED versions into a two-phased review submittal. Projects now have the option to submit LEED documentation for the Design Phase, separate from the Construction Phase. This allows the team to substantiate compliance with the LEED design requirements, providing greater assurance of success prior to starting construction.

To demonstrate the level of internal reviews recommended to track LEED compliance in a project, use the following schedule shown in Figure 18. Depending on the specific LEED credits, some will be supported via the construction drawings, some via the product specifications, and some through calculations or other documentation.

Design Phase LEED Project Management Reviews				
Project Design Phase	**LEED Scorecard**	**Drawing Review**	**Specification Review**	**Other LEED Reviews**
Project Feasibility Studies	1st LEED Feasibility Scorecard	N/A	N/A	Project Environmental Goals and Owner's Project Requirements established
Programming and Pre-Schematic Design Phase	LEED Scorecard (1 - 2x's)	Yes	N/A	Orientation optimized, Energy Models analyzed (EAc1), Daylight and View studies conducted (IEQc8)
50% Schematic Design	LEED Scorecard	Yes	Develop Specification LEED Outline	LEED Site Areas Established; Reuse water and renewable energy strategies evaluated
100% Schematic Design Phase	LEED Scorecard	As required by LEED Program Areas	Yes	Site lighting plan review (footcandle plot); LEED specs continue to be developed
50% Design Development Phase	LEED Scorecard	As required by LEED Program Areas	Yes	Design Reviewed by Commissioning Authority (EAc3), Water Reduction calculations completed (WEc1 & WEc3); Energy Model revised
100% Design Development Phase	LEED Scorecard	As required by LEED Program Areas	Yes	LEED Design template calculators – preliminary drafts due
50% Construction Documents	LEED Scorecard	As required by LEED Program Areas	Yes	LEED Design Phase LEED-Online template drafts completed for review by LEED AP
95% Construction Documents and/or Bidding Documents	Final LEED Scorecard for Construction	Final Drawing credit review	Final Specification credit review	Final submittals reviewed by LEED AP Consultant (Design Phase LEED Submittals are 90% complete on LEED-Online)
Permit Set Drawings	Final LEED Scorecard for Construction	Final Drawing credit review	Final Specification credit review	All LEED credits for applicable design changes reviewed
Addenda's	Revised LEED Scorecard, if applicable	Revised Drawing credit review	Revised Specifications credit review	All LEED credits for applicable design changes reviewed

Figure 18: Design development project schedule outline, highlighting LEED contract document and credit compliance design submission reviews.

Another method to help integrate LEED throughout the project is shown in Figure 19. This example is for a design-bid situation and overlays LEED related activities on the existing project schedule for design and construction.



Notes:
1. SD schedule assumes client acceptance of preliminary cost estimate and VE selections.
2. DD Phase Design Review Meeting dates are preliminarily set for 6/21, 7/8, 7/19 with a 7/26 VE workshop.
3. Pricing/VE to start 15 August to be from 75% DD documents with CM input as to scope required.
4. CM GMP due in October.
5. Client review is included in each phase duration.

Project design team incorporates LEED requirements into project contract documents (drawings, specifications, Invitation to Bidder's, General Conditions, Contracts, etc.)

LEED AP confirms all required LEED documentation is included in the 100% CD set of drawings and specifications.

The design team, consultants, contractors, and owner submit the preliminary LEED submittal drafts to LEED AP for review. The responsible parties corresponding to each LEED credit point must revise the LEED submittals per your CM/GC LEED coordinator's recommendations and submit final copies to LEED-Online for LEED documentation to the USGBC.

LEED AP conducts LEED job-site kick-off meeting with Contractor to review required LEED submittals.

Contractor submits all required LEED documentation to CM/GC LEED coordinator. CM/GC LEED coordinator follows up with all contractor(s) to confirm complete LEED submittal documentation.

Figure 19: Example LEED Schedule for a Design-Bid-Build project- simple excel tools to map LEED milestone and review dates

In addition to Design Phase LEED schedule integration, projects can incorporate LEED Construction Schedule Milestones into the field construction tracking schedules. Projects are recommended to include the following LEED Milestones in the project schedule:

- LEED Kick-off Charette
- SD LEED Review
- DD LEED Review
- CD LEED Review
- Commissioning Kick-off
- Design Phase LEED Submittal

✓ Due Date for Design Team LEED submittal deadline - to LEED Administrator for final review of all LEED design credits (Budget 3-5 week review for LEED Project Manager and team edit revisions before final submission to the USGBC)

- ✓ Due Date for LEED Design Phase Submittal to the USGBC - for review and award of Design Phase LEED credits
- ▪ Construction Phase LEED Submittal
- ✓ Due Date for Construction Team LEED submittal deadline - to LEED Administrator for final review of all LEED construction credits (Budget 3-5 week review for LEED Project Manager and team edit revisions before final submission to the USGBC)
- ✓ Due Date for LEED Construction Phase Submittal to the USGBC for review and award of Construction Phase LEED credits and final award
- ▪ Construction Indoor Air Quality (IAQ) Building Flushout or IAQ Test

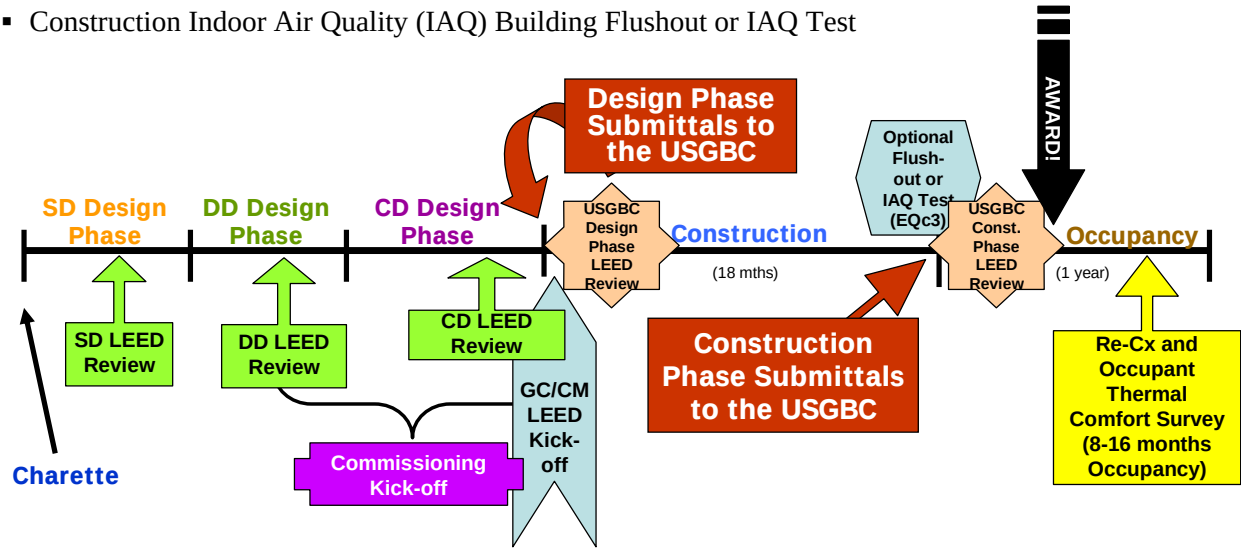


Figure 20: Typical LEED-NC Project Schedule Milestones

LEED Certification Review & Award Process

- ▪ LEED Project Administrator submits Application for Design Credits at 100% CD Phase
- ✓ *USGBC Design Phase LEED Review* - Preliminary Scorecard comes back marked as "Credit Anticipated or Credit Denied" (USGBC's intention is to review within 2 weeks, however plan for 4-6 weeks for preliminary response)

  **Reminder for Resubmission* - Project team can remedy and resubmit denied credits
- ✓ Design Credits along with construction submittal

  **Reminder for Resubmission* – Reserve project design fees for additional efforts related to LEED credit submittal rework or corrections
- ▪ LEED Project Administrator submits Application for Construction Credits at owner occupancy phase

✓ *USGBC Construction Phase LEED Review* – Final Scorecard comes back marked as "Credit Achieved or Credit Denied"

**Reminder for Submission* - Check boxes for design credits verifying nothing changed during construction. If there are changes, resubmit these credits.

**Reminder for Submission* – Although not published, Project Teams may have the opportunity to resubmit 'Denied' Construction Phase credits, or credits requiring additional clarification, to the USGBC before final certification award.

- Acceptance / Appeal - Project team accepts or appeals award
- Award - Plaque, official award, press releases (10 award certificates are issued for distribution to participating project team members with one wall plaque to be installed within the building)

LEED-Online Project Management

The LEED-Online tool is used for project document administration and certification, and is essential to manage the project's application for certification and submittal documentation efficiently. LEED-Online is currently the only way the LEED Project Administrator can submit the project for certification. Exceptions are permitted for projects qualifying, such as Pilot projects or projects registered with the USGBC for certification prior to a certain date. This LEED Guide includes a step-by-step online tutorial on using the USGBC's LEED-Online tool. Visit http://www.leedmanagement.com.

LEED-Online is currently only accessible by the LEED Project Administrator and invited team members. The invited project team members will receive an email with the following instructive steps:

To logon to LEED-Online, visit https://leedonline.usgbc.org/Login.aspx

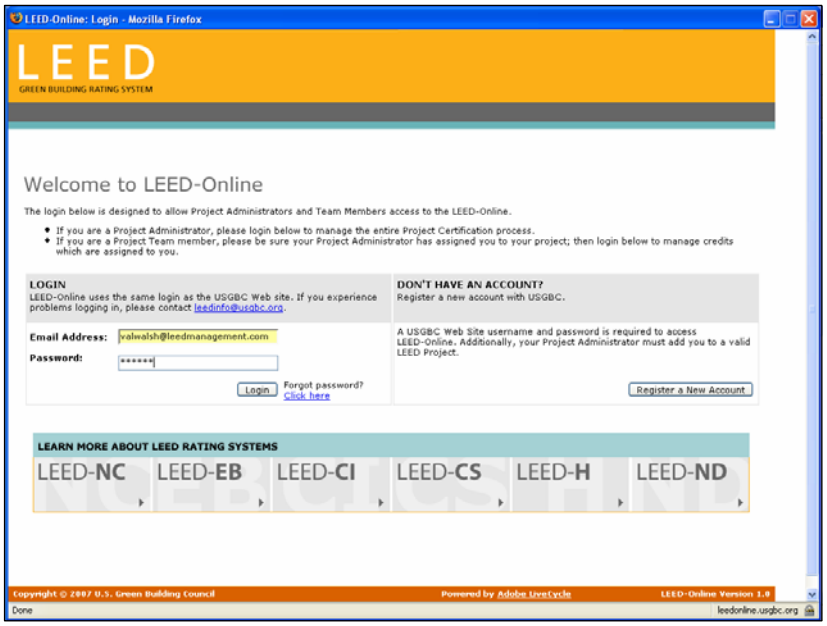


Figure 21: Login page for LEED-Online.

You will be required to enter your email and password (from your user profile account entry) to enter the LEED-Online project website.

The project's LEED Administrator, or LEED Project Manager, will assign project team members to specific credits for which they are responsible.

Once you are assigned the Responsible Party role for a LEED credit or prerequisite, you then have access to the appropriate template submittal form.

Note 'Design Phase' and 'Construction Phase' LEED credit submittals are designated with an orange 'd' or a yellow 'c' on this LEED-Online webpage.

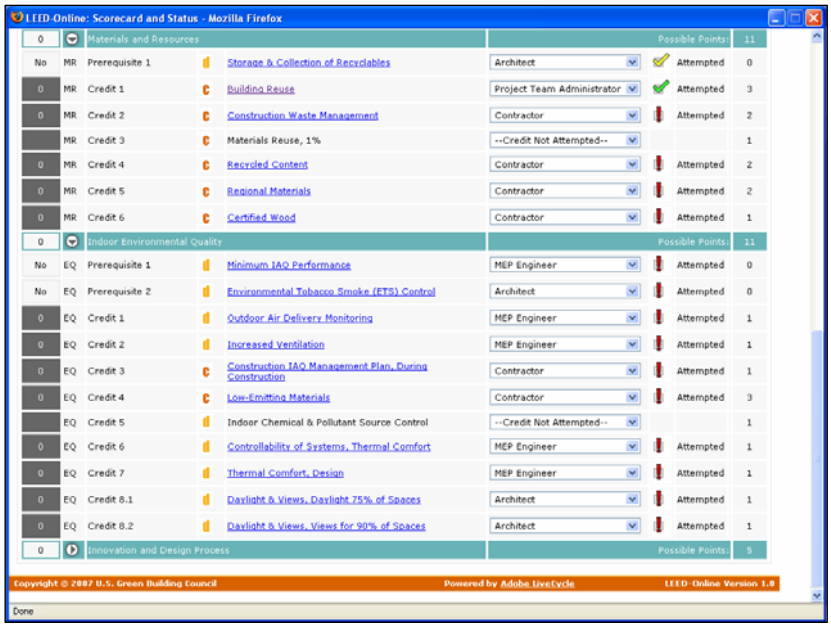


Figure 22: LEED-Online Scorecard example.

Each LEED credit submittal must be complete and sufficiently document the project's approach to achieve the sustainable credit intent.

Some LEED credit submittals require simple input and data entry on the letter templates; others require additional documents or calculations to be uploaded, or attached.

LEED Letter Templates vary in length from 1 to 15 pages.

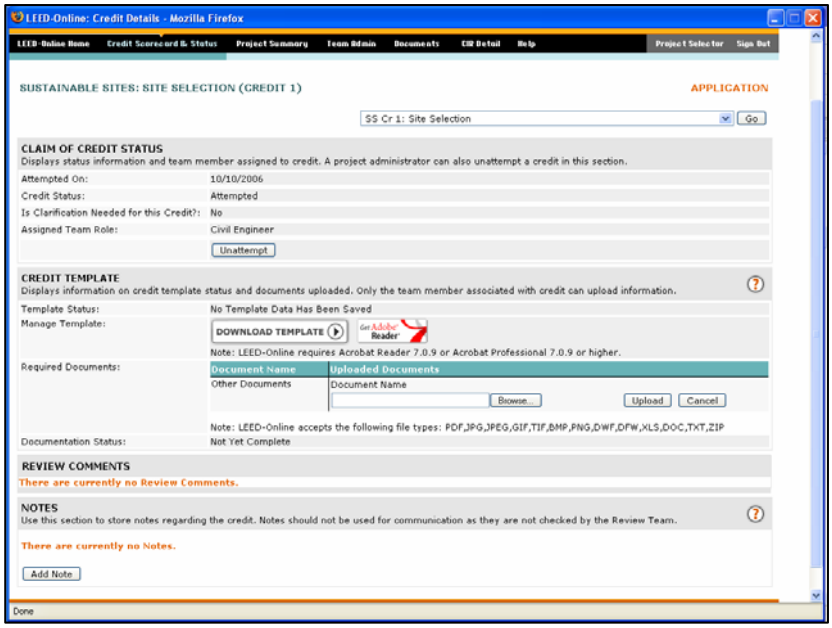
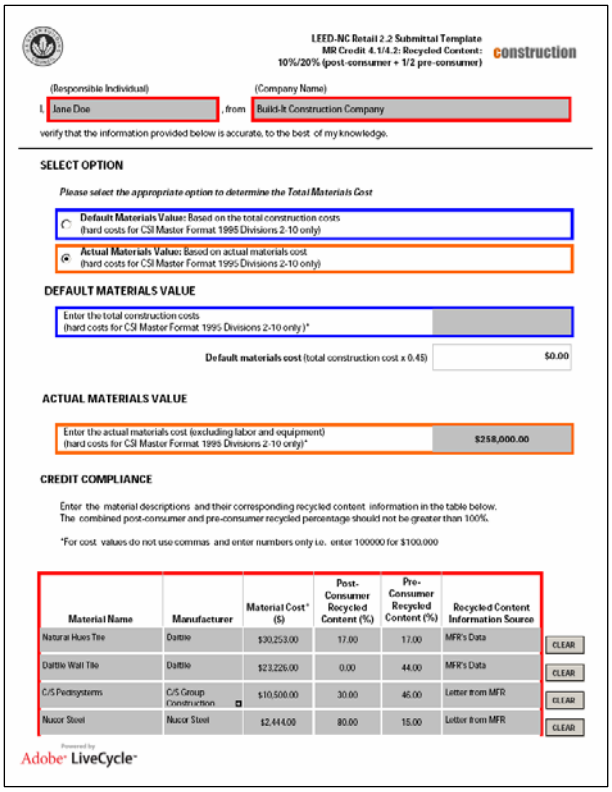


Figure 23: LEED-Online page where Letter Template and supplemental documentation are submitted by team members for review.



LEED-NC Retail 2.2 Submittal Template
MR Credit 4.1/4.2: Recycled Content: 10%/20% (post-consumer + 1/2 pre-consumer)
construction

(Responsible Individual) Jane Doe, from (Company Name) Build-It Construction Company
verify that the information provided below is accurate, to the best of my knowledge.

SELECT OPTION

Please select the appropriate option to determine the Total Materials Cost

- Default Materials Value: Based on the total construction costs (hard costs for CSI Master Format 1995 Divisions 2-10 only)
- Actual Materials Value: Based on actual materials cost (hard costs for CSI Master Format 1995 Divisions 2-10 only)

DEFAULT MATERIALS VALUE

Enter the total construction costs (hard costs for CSI Master Format 1995 Divisions 2-10 only)*

Default materials cost (total construction cost x 0.45) $0.00

ACTUAL MATERIALS VALUE

Enter the actual materials cost (excluding labor and equipment) (hard costs for CSI Master Format 1995 Divisions 2-10 only)* $258,000.00

CREDIT COMPLIANCE

Enter the material descriptions and their corresponding recycled content information in the table below. The combined post-consumer and pre-consumer recycled percentage should not be greater than 100%.

*For cost values do not use commas and enter numbers only i.e. enter 100000 for $100,000

Material Name	Manufacturer	Material Cost* ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Information Source	
Natural Hues Tile	Daltile	$30,253.00	17.00	17.00	MFR's Data	CLEAR
Daltile Wall Tile	Daltile	$23,226.00	0.00	44.00	MFR's Data	CLEAR
C/S Pectingsterns	C/S Group Construction	$10,500.00	30.00	45.00	Letter from MFR	CLEAR
Nucor Steel	Nucor Steel	$2,444.00	80.00	15.00	Letter from MFR	CLEAR

Adobe LiveCycle

Figure 24: First page of a completed Letter Template example.

Each credit pursued must have a completed LEED letter template by the assigned Responsible Party, and additional supporting documentation, as applicable.

The full-length version of this LEED letter template can be viewed in the Appendix of the expanded electronic edition of this LEED Guide at http://www.cleanenergynm.org/ or http://chapters.usgbc.org/newmexico/.

Common Hurdles Managing LEED-Online

Many LEED-Online users have experienced challenges, or frustrating lessons learned, with the USGBC's web-based certification submittal process. The recommendations below are intended to help mitigate first-time LEED-Online user problems.

- Confirm that project team members have the appropriate version of Adobe Acrobat software. Refer to the USGBC website for details on software compliance. Often older versions of Adobe do not comply with the editable-pdf format used on the LEED-Online web tool.
- Confirm that project team members have created a USGBC user account ('Your Account' on the USGBC website). The password and username established in the user profile is the same login information used to access LEED-Online. Membership with the USGBC is not required for a user account.
- Avoid urgent deadlines for LEED-Online, as there are times the USGBC-hosted website is not available.
- LEED Letter templates are alternately referred to by the USGBC as 'submittal templates', or simply 'templates'.
- The letter templates can be saved offline, and uploaded to LEED-Online once ready for review by the LEED Administrator. Project team members need not be logged onto LEED-Online to upload the template that was saved offline; once the template is complete (including username and password), simply click 'Save Template to LEED-Online'. Team members are encouraged to backup any changes to the online version of the letter template to their local disk.
- Inform project team members, and responsible parties for LEED credit submittals, that clicking "Mark as Complete" on the credit homepage does not submit the credit to the USGBC. It can be used to indicate to the LEED Administrator that the credit is ready for internal project team review, or it can be used by the LEED Administrator to indicate that the credit has been reviewed and approved. Only the LEED Administrator can formally submit all LEED credit submittal documentation to the USGBC for final certification review. The prompt to submit for certification will only appear as an option for the LEED Project Administrator when all attempted credits are complete. If a credit is no longer being pursued, click the 'unattempt' button on the credit homepage.
- Each team member is assigned a role (e.g. "architect"). The LEED Project Administrator then associates a role with each credit, indicating that team member assigned that role will be responsible for completing that credit. Multiple team members can now be assigned to a role, allowing multiple

members of one firm to update the letter templates for which the firm is responsible. Additionally, a team member can be assigned multiple roles, if necessary. Custom roles can be created by the LEED Project Administrator, which is especially helpful for projects with different core and tenant fit-out project teams.

- Each LEED-Online credit template includes a field for project participants to post 'Notes'. Currently, there is no automatic means of notifying your LEED Administrator that a 'Note' has been posted. If posting notes for comment, review, or other informative instructions, be sure to send your LEED Administrator an email to notify them that you have posted a note and draft of your LEED submittal template.
- For projects with different core and shell and tenant fit-out project teams pursuing LEED-NC, the LEED Project Administrator must pay special attention to how LEED-Online templates are managed and completed. In some cases, this may require the LEED Project Administrator to combine information from the core and shell and tenant project teams for the final LEED-Online credit submittal. The credits that will likely need combining are the Material and Resource and IEQ credits.
- It is the responsibility of the LEED Project Administrator to follow-up with the USGBC if your project has submitted for certification and has not heard back in 30 days.

Credit Interpretations and Rulings (CIRs)

Credit Interpretations provide an opportunity for registered projects to obtain further clarification from the USGBC by a formal ruling on a specific question related to a project's approach for a LEED credit strategy.

USGBC members and registered project team members have access to *view* existing CIR's on the USGBC website.

Only registered projects can *submit* Credit Interpretations, but any team member with LEED-Online access can prepare and submit a CIR. This can be done directly through LEED-Online.

Each Credit Interpretation Request requires payment at the time of the request. The current USGBC fee is $220/CIR. Projects may want to consider budgeting for one or two CIR fees as contingency for LEED.

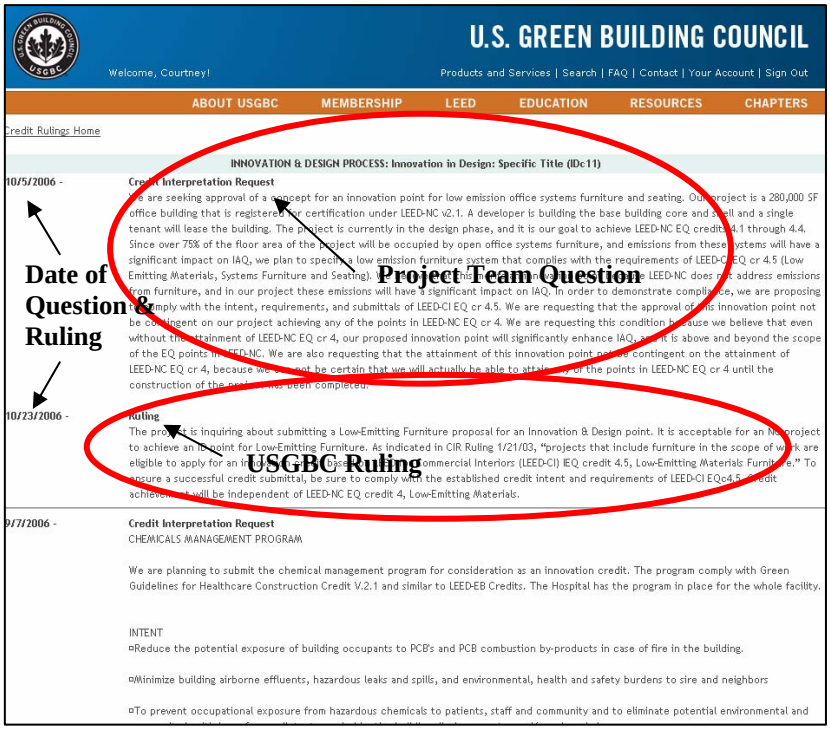


Figure 25: USGBC Website for Credit Interpretations - Requests and Rulings posted by date for each credit

Previous rulings from past projects submitting CIRs can be one of the most valuable resources for a LEED Project Manager or LEED Administrator, and should always be researched before submitting a CIR.

The date of project registration will determine the project's compliance with respect to posted CIR rulings. In other words, CIRs posted after the project registration date may be applicable to the project as an *option*, but not a requirement.

PART III: LEED CREDIT BASICS

Multiple LEED credit submittals rely on project information, such as:

- Project Gross Square Feet
- Occupant Count
- Project Site Area
- Vegetated Site Areas
- Impervious/Pervious Site Areas

It is crucial this information is accurate and is consistent throughout LEED submittal documentation. It is recommended that you not register your project until these key parameters are finalized.

7. LEED Project Information

- LEED Areas & Project Boundary

  Establish Project Boundary – Base all LEED Project Areas on a single 'LEED Boundary.'

  **Hint* – the LEED Boundary is not necessarily the Project Boundary nor the Property Line, but rather the Construction Work Limit.

  LEED Project Areas – key areas to establish early in your credit analysis

Project Site Area =	
Building Gross Square Footage =	
Building Footprint =	
Impervious Area =	Pervious Area =
Asphalt Area =	Native Vegetation =
Shaded Asphalt =	Non-Native Vegetation =
Concrete Area =	Pervious Paving =
Other Impervious Area =	Open-grid Paving =
Other Shaded Impervious Area =	Dirt, No Paving =

Figure 26: Table listing area break-outs for your LEED project - establish these areas early in the design phase for preliminary credit calculations

*Common Mistakes / Helpful Hints:

- Don't forget to include curb & gutter in your site areas

- Be careful not to double count shaded concrete areas if you are already counting the area for high SRI values for SSc7.1 – Heat Island Effect, Non-Roof

- Be aware that pervious hardscape surfaces are often mistakenly excluded from the Civil Engineer's typical impervious site area breakouts. Confirm this area is included in the project area summary table for future credit analysis.

- Occupancy Count for LEED

Establish project occupancy count, also referred to as Full-Time Equivalent (FTE) building occupants – Base multiple LEED credit calculations on this single full-time equivalent occupant count.

**Hint* – The LEED Occupant Count is *not* your project's structural, mechanical, or life-safety occupant loads. Try to use your project's *most realistic* user occupant description on which to base your LEED Occupant counts, including transient building users.

LEED CS v2.0 Full Time Equivalent (FTE) and Transient Occupant Calculation

(for buildings under 300,000 ft^2)

field color key: user entered; calculated; output

FTE Occupant Calculation*

Occupant Description	# of Occupants	Hours/Occupant/Day (8hrs = Full Time)	Total hours/day
Farmers' Market f.t. staff	6	8	48
Farmers' Market p.t. staff	3	4	12
		Total Person Hours/day (full time + part-time occupants)	60
		FTE (Total Person Hours divided by 8)	8

Leaseable Area FTE

Area Description	Building Area (ft^2)	Square Feet/FTE occupant**	Total FTE
1st floor Restaurant	5,723	550	11
2nd floor lease area	3179	250	13
**see Default Occupancy tab		FTE (from table)	24
		FTE(known + leaseable)	32

Transient Occupant Average Calculation (if annually consistent, just enter typical)

	Annual Use Period (enter peak occupants for that period)			
Occupant description	Low	Typical	Peak	Average
Farmers' Market Customer	200	1000	1200	800
Restaurant Customers	25	70	110	69
			Total Transient Occupants	869
			Peak Building Users (FTE + Transient Occupants)	901

Transient Occupant Calculation

Occupant Description	Average # of occupants at Peak	hours/occupant/day (8hrs = Full Time)	total hours/day
Farmers' Market Customer	800	0.75	600
Restaurant Customers	69	1	69
		Total Transient Occupant Hours	669
		Peak Person Hours (Transient + FTE)	729

SSc4.2: Bike Racks & Showers

Bike Spaces (3% of Peak Building Users)	28
Showers (0.5% of FTE Occupants)	1

*all calculations are rounded up to the nearest whole number.

Figure 27: Example Project Occupant Calculator used to determine what occupancy value is used for specific credit calculations

The actual occupant number must be used for projects where the tenant and occupancy counts are known.

For LEED Core & Shell projects, the project team may not know the occupant count. Because of this, compliance with some of the credits becomes complicated. For projects that do not know the final occupant count, a draft default table may be used. Currently, this occupant count table can be found in Appendix 1 of the LEED for Core & Shell Development version 2.0 Rating System www.usgbc.org/ShowFile.aspx?DocumentID=1728.

The issue of occupant count is important for a number of credits. There are three general areas where this applies:

1) The requirements for Alternative Transportation including bike racks, and parking requirements.

2) Default numbers needed to determine domestic water use reduction.

3) Default numbers needed to determine occupant density for mechanical system design and Energy Modeling.

8. Energy Modeling

A key to a successful LEED certified project is achieving high scores in the Energy & Atmosphere category. Capitalizing on the energy related LEED credit strategies not only optimizes the building's energy efficiency, but promotes long-term building payback and value to owners and occupants.

Contract the energy modeling scope of services early in the design process on a project seeking LEED certification. Energy modeling is critical to achieve an energy efficient and environmentally responsive building. Integrating an energy modeler early in the design phase will benefit the project's on-going development of energy strategies.

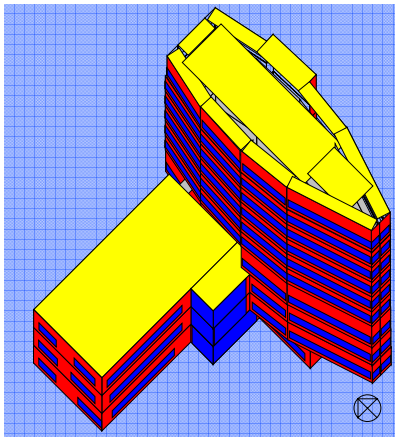


Figure 28: Example 3-D geometric model of a building by an energy modeling software program

There are many methods and approaches to energy modeling. Your project's energy modeling professional should be aware of how and when to apply the following special modeling protocols to your project:

- Exceptional Calculations Methodology
- California's Title 24 Compliance, or other local standard more stringent than the required LEED ASHRAE 90.1 referenced standard
- Confirm process loads and unregulated loads, and their applications in your project's energy model
- Prescriptive versus Performance compliance path options

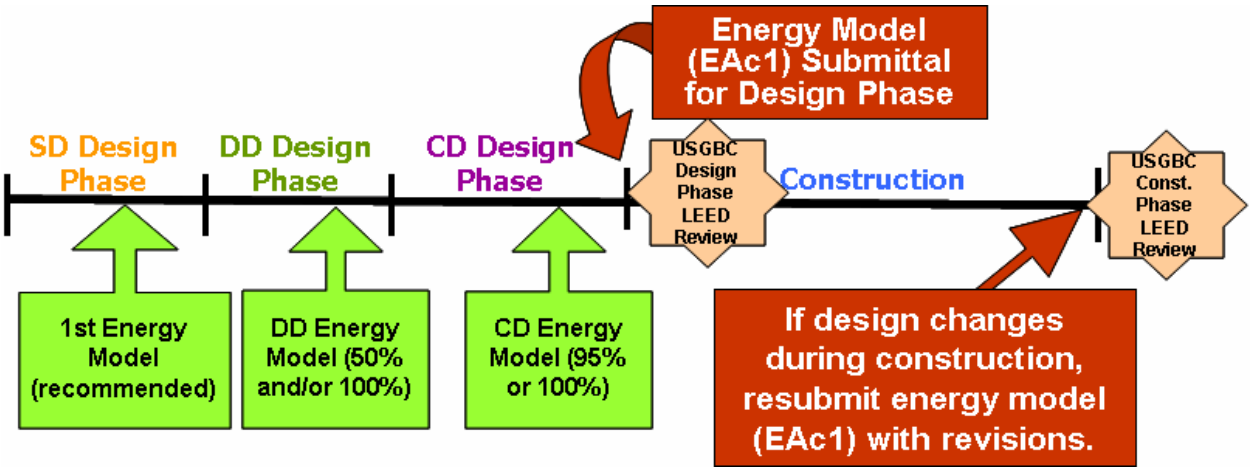


Figure 29: Project schedule timeline showing energy model integration into design and construction phases. This timeline represents projects pursuing Option 1 for EAc1 - Optimize Energy Performance, for whole building modeling and credit submittal

Many high performance building project design teams have utilized energy modeling on projects not seeking LEED certification. This valuable energy analysis design tool can help optimize the efficiencies gained from important design decisions, from building orientation to placement and scheduling of occupancy sensors for lights.

Projects should plan for and budget design fees for energy modeling services. The cost is often dependent upon the level of energy analysis and the complexity of the project design. For rule of thumb estimates, projects should budget a minimum $12,000 - $15,000 for LEED compliant full-building energy modeling, typically including only one iteration of the model. Energy modeling can be as expensive as $100,000+, depending on other modeling parameters.

Factors that impact the cost of your energy modeling scope of work:

- Size of the project
- Complexity and technological sophistication of the building program
- Quantity of renewable energy systems incorporated into the design
- Desired level of energy optimization

9. Commissioning

The basic purpose of building commissioning is to provide documented confirmation that building systems function in compliance with criteria set forth in the project documents to satisfy the owner's operational needs[6]. In other words, project commissioning is the structured process to ensure the building is built and operating as it was intended and meets the Owner's Project Requirements (OPR).

Commissioning is required for a LEED project, not only because it assists in achievement of optimal energy performance, but also, because it supports a healthy indoor environmental quality for building occupants.

[6]Building Commissioning Association

The minimum energy systems to be commissioned for LEED are:

- Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems and associated controls
- Domestic Hot Water systems
- Lighting and daylighting controls
- Renewable Energy Systems (wind, solar, etc.)
- Refrigeration Systems for qualifying projects

Other systems that may be considered for commissioning, but not required for LEED, include:

- Water-using systems
- Building envelope systems
- Medical Gas
- Restaurant and/or laboratory equipment
- Special process loads

The following section on Commissioning (Cx), excerpted from the LEED-NC v2.2 Reference Guide and USGBC website, describes the Commissioning Authority's (CxA) role and identifies who can serve as the CxA. Your project LEED Consultant can interpret the specifics of the Cx requirements and how and when to implement them.

Who Can Be the Commissioning Authority?

LEED-NC version 2.2 New Construction EAp1; EAc3

01/03/06 LEED-NC version 2.2 Cx Subcommittee

Party Acting as the Commissioning Authority (CxA)	**EAp1 Fundamental Commissioning Prerequisite [2, 4; 5]**		**EAc3 Enhanced Commissioning Credit [3, 4; 5]**
	<50k sf	>=50k sf	
1. Employee or subcontractor of the General Contractor with construction responsibilities	Y		
2. Employee or subcontractor, with construction responsibilities, of the Construction Manager (CM) who holds constructor contracts	Y		
3. Employee or subcontractor, with project design responsibilities, of the Architect or Engineer of Record (A/E)	Y		
4. Disinterested [1] employee or a subcontractor of the General Contractor or CM	Y	Y	
5. Disinterested [1] employee of the A/E	Y	Y	
6. Disinterested [1] subcontractor to the A/E	Y	Y	Y
7. Construction Manager not holding constructor contracts	Y	Y	Y
8. Independent consultant contracted to Owner	Y	Y	Y
9. Owner employee or staff	Y	Y	Y

[1] "Disinterested" means an employee or subcontractor who has no project responsibilities other than commissioning.

[2] Fundamental Cx Prerequisite requirements (summary—see USGBC requirements for more detail):

1. Designate a commissioning authority.
2. Owner documents owner project requirements (OPR). A/E develops basis of design (BOD). CxA reviews.
3. Develop and use commissioning requirements in construction documents.
4. Develop and use a commissioning plan.
5. Verify installation and performance of systems.
6. Complete a summary commissioning report.

[3] Enhanced Cx Credit requirements (summary): (the CxA individual must themselves do 2, 3; 6)

1. Prior to construction documents phase, designate an independent commissioning authority to oversee "all commissioning activities."
2. CxA perform review of OPR, BOD and design documents prior to mid-construction documents phase and perform a back-check .
3. CxA review contractor submittals.
4. Develop a systems manual.
5. Verify operator and occupant training.
6. CxA perform a post-occupancy review.

[4] The "all" in the Enhanced Cx Requirement 1 means if a project is seeking the Enhanced Cx credit, the same CxA overseeing the Enhanced Cx tasks must also oversee the Fundamental Commissioning tasks.

[5] Regardless of who the CxA works for, they "shall have documented commissioning authority experience in at least two building projects" and ideally meet the minimum qualifications of having "a high level of experience in energy systems design, installation and operation, commissioning planning and process management, hands-on field experience with energy systems performance, interaction, start-up, balancing, testing, troubleshooting, operation, and maintenance procedures and energy systems automation control knowledge."[7]

Although the team participates with the CxA to assist in achieving many of the Cx requirements, the CxA will typically be involved in all of the requirements and tasks of the Cx prerequisite and Cx credit.

It is advisable to bring the CxA in early in the design process for many reasons. The owner and team realize earlier design input and feedback on the energy related systems from a third party. Another advantage is that the OPR gets written earlier which focuses the project's sustainable goals in a documented and structured form. Ideally, the design and construction team will participate with the owner and CxA in writing the OPR together. This is a tremendous opportunity that unifies the team from the start. Lastly, when a CxA joins the project early, the team, and in particular the Contractor, becomes familiar with this Cx role, how it works and how to prepare for this process.

[7] Who Can Be the Commissioning Authority (www.usgbc.org/ShowFile.aspx?DocumentID=1262)

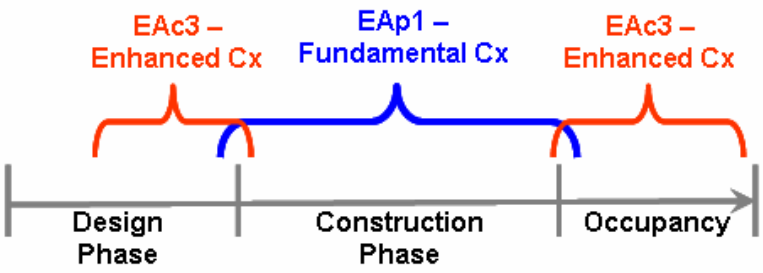


Figure 30: The LEED Commissioning scope and related prerequisite and credit timelines are shown integrated into the project's schedule from design through occupancy phases

The commissioning scope of work for LEED is critical for certification success, as well as to assure your building operates as intended. Therefore, it is important to obtain a qualified Commissioning Authority for your LEED project. The following questions may help in determining the qualifications of a CxA candidate:

1. How familiar are your firm's expected team members with the LEED Rating System and the formal certification process?
2. Has your firm ever participated on a project seeking LEED, or that has achieved LEED certification? If so, what project(s)? What level was sought or awarded? Describe your role or responsibilities related to LEED on the project.
3. Has your firm participated in, or used, the LEED-Online submittal documentation web process?
4. For outstanding building deficiency issues, describe the proposed action plan for resolution, once building occupants have occupied the space.
5. List the energy and building systems that will be covered in the Commissioning scope of services included in the proposed fee.
6. For additional services that may be requested, please provide an estimated cost fee proposal for the following additional scopes of service:

a. Blower-door test to verify tobacco smoke containment in multi-family units

b. Building occupant thermal comfort survey (IEQc7.2 credit compliance)

c. Additional building systems to be commissioned (i.e. baggage handling systems in airports, escalator conveying systems in malls, medical gas in hospitals, food refrigeration systems in supermarkets, etc.)

Visit www.bcxa.org and www.cacx.org for additional resources related to commissioning your project. Commissioning associations often post sample RFPs, specifications, and even costing rules of thumb on these sites. Refer to these sources as local market economics and accessibility to qualified Commissioning Authorities may impact how easily your project can meet the LEED prerequisite and credit requirements for commissioning your project.

10. Innovation in Design Credits

The LEED Innovation in Design credit category includes four credits which may be achieved by any sustainable strategy elected by the project team. In order to successfully achieve an innovation credit, the following must apply:

- Innovation points can not be awarded for products or materials alone.
- Innovation points can only be awarded for strategies that are repeatable by others.
- Innovation points are awarded for strategies that are quantifiable and measurable.
- Innovation points are awarded for strategies that exceed the LEED credit threshold (exceptional achievement of an existing credit).
- Innovation points can be awarded for strategies from other LEED rating systems (EB, CI, CS, ND, etc.)

There is currently no published list available of accepted Innovation in Design LEED credits. Prior to establishing your project's targeted innovation credits, research existing CIRs for this category.

For example, the CIR below demonstrates the level of effort required to achieve a LEED Innovation credit for a Green Housekeeping Policy[8].

Green Housekeeping Policy – Innovation in Design Credit Approach

Developed and maintained by the building owner. The Green Housekeeping submittal must address the following in order to achieve a LEED ID credit:

Demonstrate that a comprehensive green cleaning/housekeeping program is in place with clear performance goals, including:

1. A statement of purpose describing what the policy is trying to achieve from a health and environmental standpoint, focusing on cleaning chemicals and custodial training at a minimum.

2. A contractual or procedural requirement for operations staff to comply with the guidelines, including a written program for training and implementation.

3. A clear set of acceptable performance level standards by which to measure progress or achievement, such as Green Seal standard GS-37 (see www.greenseal.org) or California Code of Regulations, Title 17 Section 94509, VOC standards for cleaning products (go to www.calregs.com, click on California Code of Regulations÷ and perform a keyword search for).

4. Documentation of the programs housekeeping policies and environmental cleaning solution specifications, including a list of approved and prohibited chemicals and practices. Demonstrate that the products used in the project are non-hazardous, have a low environmental impact, and meet the criteria set forth in #3 above. Concentrated cleaning products should be utilized when available.

[8]Refer to IDc1.1 CIR posted 4/8/04

11. LEED Contractor Submittals

Although many of the LEED credits are 'anticipated' to be achieved from a project's Design Phase LEED submittal, Construction-related LEED credits are often crucial to achieve the final level of Certification desired – Certified, Silver, Gold, and Platinum.

The success in achieving LEED Construction credits, and the associated sustainable construction practice in the field, is entirely dependent upon the LEED submittal documentation protocol established, managed, and enforced by the construction manager (CM) or general contractor (GC), from the beginning of the project. The most important factors a CM/GC should be aware of on a LEED project include:

12. Contractor Team LEED Roles

Task – Design Phase	**CM/GC Responsible Party**		
	Field Engineer / Onsite Administrator	**Project Manager**	**Superintendent**
1. LEED policy decision and/or contract obligation (review for risk management)		√	
2. Confirm which Construction credits the project is targeting to pursue		√	√
3. Assign LEED Champion for on-site GC/CM team	√		
4. Logon to LEED-Online; confirm GC/CM LEED Champion is assigned and has access to assigned LEED Construction credit submittal templates	√		
5. Develop and incorporate LEED submittal templates into contract documents/100% Construction Documents		√	
Task – Bidding/Pre-Construction Phase	**Responsible Party**		
	Field Engineer / Onsite Administrator	**Project Manager**	**Superintendent**
6. Incorporate LEED requirements into Instructions to Bidders or other Invitation to Bid documents for bidding subcontractors		√	
7. Conduct informative meetings (Pre-Bid Meetings) to bidding subcontracting community for questions or clarifications related to LEED requirements on the project (*optional*)	√	√	√
8. Research and develop the project's Construction Waste Management Plan	√		√
9. Research and develop the project's Construction Indoor Air Quality Management Plan	√		√

Task – Construction Phase	Responsible Party		
	Field Engineer / Onsite Administrator	Project Manager	Superintendent
10. Conduct LEED Construction-Kick off with all major subcontracting trades (MEP + Cx Agent, especially)	√	√	√
11. Develop LEED Construction project orientation / sign-off for all future participating subcontracting trades (similar to safety review & sign-off)	√	√	
12. Coordinate and participate in the Commissioning Agent's kick-off meeting or special requirements related to the commissioning scope of services for the project.	√	√	√
13. Manage / Quality Control, record, & submit Construction Waste Management recycling program & haul tracking totals on a regular basis.			√
14. Manage / Quality Control, record, & submit Construction IAQ Management plan and documented practices, including site photographs.			√
15. Manage, record, and submit product information related to MR credits, including cut sheets or submittals documenting Resource Reuse (MRc3), Recycled Content (MRc4), Harvesting / Manufacturing Location (MRc5), Rapidly Renewable content (MRc6), etc.	√		
16. Manage / Quality Control; record, & submit product information for low-emitting materials used on the jobsite during construction (i.e. low-VOC adhesives, sealants, paints, carpets, & urea-formaldehyde free composite woods)	√		
17. Manage, record, & submit product information for LEED FSC certified Wood (applies to virgin wood purchased in the project)	√		
18. Submit additional extraneous product submittal information for LEED credit documentation, including, but not limited to: ▪ Roof product data (SRI value) ▪ Impervious surface product data (SRI values) ▪ Light fixture cut sheets ▪ Plumbing fixture cut sheets ▪ Innovation in Design credits (as applicable)	√		
19. Manage, record, and submit documentation related to a project's building flush-out, or IAQ test (supporting documentation for IEQc3.2)	√		√

Task – Post-Construction / Occupancy Phase	Responsible Party		
	Field Engineer / Onsite Administrator	Project Manager	Superintendent
20. Coordinate with LEED Champion for completion or resubmittal of LEED Construction-related credit submittals.	√	√	
21. Coordinate with Commisioning Authority for outstanding non-compliant installations, and/or subcontractor items, for project close-out and owner turnover.	√	√	√
22. Close-out LEED documentation for all responsible parties.	√	√	

Figure 31: Spreadsheet matrix showing various roles of Construction Team through design and construction phase of a project seeking LEED certification[9]

13. Example - Custom LEED Construction Worksheets:

In addition to the General Conditions section in most LEED project specifications, custom templates can facilitate the contractor's documentation for LEED-Online submittals.

The following examples are custom templates for internal documentation for LEED construction credit submittals.

- *Material & Resource Credits (MRc3—5)*

LEED - Project Name
City, New Mexico
MR Credit 4 / MR Credit 5

	Description of Material	Material Cost (Less Labor & Equipment)	MR Credit 4 Recycled Content Post-Consumer	Post-Industrial	Value	MR Credit 5 Local/Regional Materials Local Manufact (M)	Local Harvest (H)	Address	MR Credit 3 Resource Reuse
		[$]	[%]	[%]	[$]	[$]	[$]		[$]
002	SITEWORK								
	Hardscape Company Inc.								
	Concrete Pavers								
	Cement	$ 6,700	0%	0%	$ -	$ 6,700	$ -	Santa Fe, NM	
	Flyash	$ 2,010	0%	100%	$ 1,005	$ 2,010	$ -	NMY Terminal	
	Natural Aggregate	$ 49,580	0%	0%	$ -	$ 49,580	$ 49,580	Aggregate Industries - Platte River	
	Recycled Aggregate (concrete)	$ 6,700	100%	0%	$ 6,700	$ 6,700	$ -	Pavestone Company - Denver, CO	
	Admixtures	$ 2,010	0%	0%	$ -	$ -	$ -		
	Stone Pavers	$ 48,000	0%	0%	$ -	$ 48,000	$ 48,000	Boulder, CO (Harvasted) Longmount, CO (Manufactured)	
	Aggregate	$ 8,000	0%	0%	$ -	$ 8,000	$ -	Aggregate Industries - Platte River	
	Fabric	$ 4,000	0%	0%	$ -	$ -	$ -		
	Concrete Edger	$ 600	0%	0%	$ -	$ -	$ -		
	Sealer	$ 2,000	0%	0%	$ -	$ -	$ -		
	New Mexico Hardscape Contractors								
02530	Ready Mix Concrete							Chambers Plant - 2650 Chambers Road	
	Cement - Cemex	$ 41,151	0%	0%	$ -	$ 41,151	$ 41,151	Cemex Plant - Lyons, CO (Harvest), Chambers Plant (Manuf)	
	Aggregate	$ 198,010	0%	0%	$ -	$ 198,010	$ 198,010	Lafarge Spec Agg Plant (Harvest), Chambers Plant (Manuf)	
	Water	$ 19,060	0%	0%	$ -	$ 19,060	$ 19,060	City, NM Jobsite	
02530	Welded Wire Mesh	$ 20,010	25%	0%	$ 5,003	$ -	$ -		
003	CONCRETE								
	Concrete Brothers LLC								
	Ready Mix Concrete								
	Cement - Cemex	$ 59,829	0%	0%	$ -	$ 59,829	$ 59,829	Cemex Plant - Lyons, CO (Harvest), Chambers Plant (Manuf)	
	Flyash	$ 14,945	0%	100%	$ 7,473	$ 14,945	$ 14,945	ISG Plant - Henderson, CO (Harvest), Chambers Plant (Manuf)	
	Aggregate	$ 375,353	0%	0%	$ -	$ 375,353	$ 375,353	Lafarge Spec Agg Plant (Harvest), Chambers Plant (Manuf)	
	Admixture	$ 3,742	0%	0%	$ -	$ 3,742	$ -	Chambers Plant - 2650 Chambers Road	
	Water	$ 32,077	0%	0%	$ -	$ 32,077	$ 32,077	Chambers Plant - 2650 Chambers Road	
	NM Asphalt Specialties Co.								
	Recycled Asphalt	$ 364,562	0%	0%	$ -	$ 364,562	$ -	City, NM Jobsite	$ 364,562
	Recycled Concrete	$ 140,863	0%	0%	$ -	$ 140,863	$ -	City, NM Jobsite	$ 140,863

Figure 32: Example custom LEED Construction Worksheet for MRc3, 4, & 5

[9]©2007 LEED Management Services

						MR Credit 3	MR Credit 4			MR Credit 5		MR Credit 6	MR Credit 7	
Description of Material		Total Construction Cost	Labor Cost	Equipment Cost	Material Cost (Less Labor & Equipment)	Resource Reuse	Recycled Content			Regionally Harvested / Manufactured Materials		Rapidly Renewable Materials	New Wood-Based Materials	Certified Wood
							Post-Consumer	Post-Industrial	Value	Credit 5.1 10%	Credit 5.2 20%			
		[$]	[$]	[$]	[$]	[$]	[%]	[%]	[$]	[$]	[$]	[$]	[$]	[$]
02	SITEWORK													
02200	Dewatering				$0				$0					
02300	Earthwork				$0				$0					
02700	Reclaimed Concrete				$0				$0					
02800	Site Improvements & Amen.				$0				$0					
02900	Planting				$0				$0					
02900	Compost				$0				$0					
03	CONCRETE													
03200	Rebar				$0				$0					
03300	Cast-in-Place Concrete				$0				$0					
04	MASONRY													
04050	Masonry/Concrete Protect.				$0				$0					
04200	Brick (salvaged)				$0				$0					

Figure 33: Example custom LEED Construction Worksheet for MR credits 3-7

LEED MRc4 - Recycled Content Calculations
Contractor Submittal Template

Material Name	Manufacturer	Material Cost* ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Information Source
Total value ($) of post-consumer content					$
Total value ($) of pre-consumer content					$
Total combined recycled content value ($):					$
post-consumber + 1/2 pre-consumer					
Combined Recycled Content Value					%
(as a percentage of Total Material Cost)					

Figure 34: Example custom LEED Construction Worksheet for MRc4 – Recycled Content

Subcontractor LEED Material & Resource Credits
Submittal Cover Sheet

			Recycled Content						
Specification Section	Product / Material Description	Total Material Cost ($)	Post Consumer (%)	Pre-Consumer (%)	Recycled Content Value ($)	Regional Harvest / Manufacture ($)	Certified Virgin Wood (%)	FSC Certified Wood Value ($)	NOTES
02200	Earthwork	$0	0%	0%	$0	$0	0%		Labor Only
04200	Masonry	$52,600	10%	2%	$5,786	$45,000	0%		
05100	Structural Steel	$339,700	0%	98%	$166,453	$256,000	0%		
07900	Steel Doors & Frames	$22,000	25%	0%	$5,500	$20,000	0%		
09300	Ceramic Tile	$9,000	46%	0%	$4,140	$9,000			check VOC's
09700	Wood Panels	$60,000	0%	0%	$0	$60,000	100%	$60,000	
09900	Paint	$7,000	0%	0%	$0	$0	0%		check VOC's

Figure 35: Example custom LEED Construction Worksheet for MR credits this project is targeting

- *Construction Waste Management Credits (MRc2.1 & 2.1)*

  Over 30% of waste going to landfills is construction waste.

  Over 80% of that waste can be recycled.[10]

  Keys to Construction Waste Management Success:

  1. Training & Education – do's & don'ts program signed-off by subs, compaction
  2. Signage program – well labeled, bi-lingual, and weather-proofed
  3. Tracking – monthly status reports, on-site management, tracking metric – weight or volume. Most projects come out ahead using weight, but depending on your circumstances, volume may be a consideration. Keep in mind that the volume conversion does not account for compaction.
  4. Construction Waste Recycling ***PLAN*** – effective communication of the following:
     - ✓ Waste recycling goals
     - ✓ Identified recycling and waste haulers
     - ✓ Communication plan / subcontractor participation
     - ✓ Recycled materials inclusions / exclusions
     - ✓ Expected project waste, disposal, and handling
     - ✓ Management / administration of waste recycling
     - ✓ Supervision / quality control of waste recycling

  At a minimum, the following construction waste and debris should be considered for recycling on any construction project:

Figure 36: The Villagra Building in Santa Fe recycled 82% of all construction and demolition waste. (photo: LEED Management Services)

1. Concrete, Brick, Rock, & Aggregate
2. Asphalt & Aggregate
3. Steel and other Metals
4. Drywall and/or Gypboard
5. Wood
6. Cardboard
7. Mixed Paper / Cans / Bottles (including jobsite office trailer)

The General Contractor is required to provide a Construction Waste Management Plan for the project's LEED MRc2 Construction Waste Recycling credit submittal documentation. A full-length example Construction Waste Management Plan template is included in the Appendix of the electronic edition of this Guidebook at http://www.cleanenergynm.org/ or http://chapters.usgbc.org/newmexico/.

[10] Waste-Not Recycling, http://www.waste-not.com/

LEED MRc2: Construction Waste Managem										
Project Name: Example										
Haul Date	Hauler	Haul Site	Weight of Diverted Material (Tons)						Weight of Landfill Material (Tons)	Notes
			Concrete	Wood	Steel	Asphalt	Cardboard	Other (Specify material in Notes column)		

Figure 37: Example custom LEED Construction Worksheet for MRc2 – Construction Waste Recycling

General Contractor Name			
Project Name			
Waste Management Log			
Date	**Material**	**Material Destination**	**Weight (tons)**
Recycled and or Reused			
Landfill Waste			
		Recycled and/or Reused (tons)	0
Last Updated:	*Date*	Landfill Material (tons)	0
		Percent Diverted	%

Figure 38: Example custom LEED Construction Worksheet for MRc2 – Construction Waste Recycling, format shown here includes recycling percentage totals for the project

Even salvage, remodeling, or building reuse projects include construction waste recycling efforts in a similar tracking method:

Salvaged/Recycled/Diverted Material Summary												
				Materials (tons)								Total
Bid Package	Date	Salvager/Hauler	Recycler Identification	Concrete	Wood	Steel	Asphalt	Cardboard	Masonry	Glass	Aluminum	tons
Pre-Construction												
Building Value	11/16/2005	Building Value	N/A	-----	**9.5**	**20.7**	-----	-----	-----	**2.7**	-----	33.0
New Mexico University	11/21/2005	Mikey Tree Expert Company	N/A	-----	-----	-----	-----	-----	-----	-----	-----	0.0
New Mexico University	12/5/2005	New Mexico University	N/A	-----	**82.0**	**34.2**	-----	-----	-----	-----	**1.1**	117.3
NM Fire Department	11/23/2005	NM Fire Department	N/A	-----	**0.6**	**5.3**	-----	-----	-----	-----	-----	5.9
Queen of Saints Church	11/17/2005	Queen of Saints Church	N/A	-----	**0.8**	**0.7**	-----	-----	-----	-----	-----	1.5
BP-A Deconstruction				-----	-----	-----	-----	-----	-----	-----	-----	0
O'Malley Wrecking	Nov. 2005	O'Malley Wrecking	Riverside Metals Recycling	-----	-----	**11.76**	-----	-----	-----	-----	-----	11.8
O'Malley Wrecking	Dec. 2005	O'Malley Wrecking	Riverside Metals Recycling	-----	-----	**43.19**	-----	-----	**90.51**	-----	-----	133.7

Figure 39: Example custom LEED Construction Worksheet for MRc2 – Construction Waste Recycling, example shows how demolition can be tracked to contribute towards this credit

- *Construction Indoor Air Quality Management Credits (IEQc3.1 & 3.2):*

  Americans spend an average of 90% of their time indoors.[11]

  Studies report 16% productivity increase in buildings with improved indoor environmental quality.[12]

  There are several resources and links available to guide any contractor through the development and implementation of a successful on-site construction IAQ program. The Sheet Metal and Air Conditioning National Contractors Association (SMACNA) "IAQ Guidelines for Occupied Buildings Under Construction." www.smacna.org contains the referenced standard applicable to create your project's IAQ Plan.

Figure 40: Photographs showing air quality management practices by the contractor during various phases of construction. From top to bottom: Ducts are sealed with plastic immediately after installation to prevent entrance of dust, dirt, or water (SMACNA 3.2 HVAC protection); protect materials from exposure to moisture (SMACNA 3.5 Housekeeping); a fan provides additional ventilation during painting and finishing operations (SMACNA 3.3 Source Control).

Keys to Construction IAQ Management Success:

1. Training & Education – do's & don'ts, program sign-off with subs
2. Tracking – field quality control and random inspections, photographic documentation, filter replacement logs
3. Construction IAQ Management ***PLAN*** – effective communication of the following:

   - ✓ IAQ Goals and Intent
   - ✓ Communication Plan / Subcontractor Participation
   - ✓ Permitted & Prohibited scopes of work
   - ✓ 5 SMACNA Guidelines: HVAC Protection, Source Control, Pathway Interruption, Scheduling, and Housekeeping
   - ✓ Minimum IAQ Standards & Recommended Best Practices
   - ✓ Supervision / Quality Control of IAQ Plan on site
   - ✓ Photographic Documentation

The General Contractor is required to provide a Construction Indoor Air Quality Management Plan for the project's LEED IEQc3.1 - Construction IAQ Management credit submittal documentation. A full-length example Construction IAQ Plan template is included in the Appendix of the electronic edition of this Guidebook at http://www.cleanenergynm.org/ or http://chapters.usgbc.org/newmexico/.

[11] USGBC's LEED Reference Manual page 287
[12] Rocky Mountain Institute's 1994 *Greening the Building and the Bottom Line*

Construction IAQ
Filter Replacement Log

If air handling units were operated during construction, provide a listing of the installed filters and their locations in the table below.

Filter Manufacturer	Filter Identification (Model #)	Filter MERV Rating	Location of Installed Filter	Fitler was Replaced Immediately Prior to Occupancy	
				_____ Yes	_____ No
				_____ Yes	_____ No
				_____ Yes	_____ No
				_____ Yes	_____ No
				_____ Yes	_____ No
				_____ Yes	_____ No

Figure 41: Example custom LEED Construction Worksheet for IEQc3.1 – Contractor completes the table showing filter replacement protocol for the project

- *Indoor Environmental Quality Credits (IEQc4.1 – 4.4):*

  The General Contractor is responsible for collecting all necessary VOC and other Material Safety Data Sheet (MSDS) product data information during construction to support the project's compliance with the low-emitting material credits. LEED-Online templates will be required, including additional supporting information like MSDS and product cut sheets.

  Some helpful hints when managing your project's Low-Emitting Material credits (IEQc4.1 – 4.4):

  - ✓ Require all subcontractors to submit Low-Emitting Material cover sheets stating VOC levels or Urea-Formaldehyde content for ALL products on the project. No exceptions – this sets the standard for reporting VOC levels on the project.
  - ✓ Confirm paint classification as flat or non-flat:
  - ✓ *Flat Coatings – register a glass of less than 15 on an 85-degree meter or less than 5 on a 60-degree meter. Non-Flat Coatings – register a glass of 5 or greater on a 60-degree meter and a glass of 15 or greater on an 85-degree meter.*[13]
  - ✓ Confirm all scopes covered – LEED recently added aerosol adhesives, stains, varnishes, clear wood finishes, shellacs, etc. to the list of products that must comply with low-VOC contents.
  - ✓ Only on-site applied adhesives, sealants, paints, coatings, and carpet systems pertain to Indoor Environmental Quality credits 4.1, 4.2, and 4.3. Shop-finishes, or manufacturer painting off-site, do not apply.
  - ✓ All composite and agrifiber products must be urea-formaldehyde free.

[13] USGBC LEED-NC v2.2 Reference Guide, 1st Edition, page 339

LEED Low-Emitting Materials Spreadsheet (IEQc4.1-4.4)						
Product Type (Paint, Adhesive, Sealant, Carpet or Composite Wood)	**Product Name**	**Manufacturer**	**VOC (g/L)**	**Product Description**	**Type of Resin Binder** (for composite wood only)	**Product Application** (interior or exterior)

Figure 42: Example custom LEED Construction Worksheet for IEQc4.1 – 4.4 in one table

LEED IEQc4.1 - Low Emitting Materials, Adhesives & Sealants **Contractor Submittal Form**					
List all Adhesives, Sealants, and Sealant Primer Products					
Product Manufacturer	**Product Name / Model**	**Product VOC Content (g/L)**	**SQAQMD Allowable VOC Content (g/L)**	**Source of VOC Data**	**Interior / Exterior Application?**

Figure 43: Example custom LEED Construction Worksheet for IEQc4.1 – Low Emitting Adhesives and Sealants, including designation for interior or exterior applications

LEED IEQc4.2 Low Emitting Materials, Paints & Coatings **Contractor Submittal Form**					
List all Paints and Coating Products					
Product Manufacturer	**Product Name / Model**	**Product VOC Content (g/L)**	**Green Seal GS-11 VOC Content (g/L)**	**Source of VOC Data**	**Interior / Exterior Application?**

Figure 44: Example custom LEED Construction Worksheet for IEQc4.2 – Low Emitting Paints and Coatings, including designation for interior or exterior applications

LEED IEQc4.3 - Low Emitting Materials, Carpet Systems Contractor Submittal Form				
List all installed Indoor Carpet Systems				
Product Manufacturer	Product Name / Model	Product meets CRI Green Lable Plus Program?		Source of Compliance Data
		_____ Yes	_____ No	
		_____ Yes	_____ No	
		_____ Yes	_____ No	
		_____ Yes	_____ No	
		_____ Yes	_____ No	

Figure 45: Example custom LEED Construction Worksheet for IEQc4.3 – Low Emitting Carpet Systems, including verification for referenced standard compliance

LEED IEQc4.4 - Low Emitting Materials, Composite Wood & Agrifiber Products Contractor Submittal Form					
List all installed Composite Wood and Agrifiber Products					
Product Manufacturer	Product Name / Model	Product contains No Added Urea-Formaldehyde Content?		Source of Compliance Data	Interior / Exterior Application?
		_____ Yes	_____ No		
		_____ Yes	_____ No		
		_____ Yes	_____ No		
		_____ Yes	_____ No		
		_____ Yes	_____ No		

Figure 46: Example custom LEED Construction Worksheet for IEQc4.4 – Urea Formaldehyde-free Composite Wood and Agrifiber Products, including designation for interior or exterior applications

14. Online Appendix

LEED Credit Tools

Example Construction Waste Management Plan
Example Construction Indoor Air Quality Plan
MRc4: Recycled Content completed full-length LEED-Online Letter Template
New Mexico Baseline LEED Scorecard
LEED Relative Cost and Project Phase

The Appendix can be located in the electronic edition of this Guide at www.cleanenergynm.org/ and http://chapters.usgbc.org/newmexico/.

EXAMPLE

CONSTRUCTION WASTE MANAGEMENT PLAN

Company:
Project Name:
Project Location:
Date Plan Authored:
Designated Recycling Coordinator: Site Contact

Construction Waste Management Goals:

- This project will recycle or salvage for reuse 75% by weight of the waste generated on-site.
- Divert waste created through construction processes from landfills through salvage and recycling.

On-Site Communication Plan:

- All recycling containers will be provided and clearly labeled by Hauler X.
- Lists of acceptable/unacceptable materials will be posted on recycling bins and throughout the site
- The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan
- All recycled material signage is to be bi-lingual and visible on at least two sides of haul containers

Construction Waste Management, Administration, and Quality Control:

- On a monthly basis Contractor will collect hauling receipts, logs, etc. from subcontractors and contracted recycling hauler. Receipts are required to record the quantity, by weight, of each material salvaged, reused, recycled, or disposed of from the construction site, the final haul location, and use of the material.
- Additional documentation of the construction waste management plan will occur through job site photos of recycling activities and methods.
- Salvaged materials, recyclables, and waste will be tracked and documented by means of receipts from the waste management subcontractor.
- The General Contractor shall be responsible for obtaining and submitting proper documentation for the LEED credit.
- Percentages of all salvaged and recycled materials will be calculated monthly and summarized at the end of the project (with LEED consultant's assistance), demonstrating the amounts of salvaged or recycled items, based on weight.
- Subcontractors who opt to recycle / reuse their own waste are required to submit a log and receipts of any and all quantities of such materials to site contact.
- Reminder to all employees, subcontractors, suppliers, etc., that LEED goals are to be emphasized by on site personnel at the weekly Safety meetings.

- (Optional) Subcontractors who are caught throwing unacceptable materials into recycled material only bins will be required to remove the unacceptable material from the bin and dispose of it properly. If the guilty party refuses to remove the unacceptable material from the bin, they will be back-charged for Contractor labor to complete the task.

Projected Construction Waste, Disposal, and Handling:

- **Concrete**
  - Disposal Method: Recycle – Dispose of in dumpster labeled "Concrete Only.'
  - Handling Procedure: Break up any wastes and wash-out, and put into concrete bin. If concrete only bin is not present on site, place acceptable materials in concrete only pile for future disposal. Location of concrete pile is to be determined by contractor superintendents and foremen only.
  - Handled By Who: Concrete Wash-Out Hauler X
  - Acceptable Materials:
    - ✓ Demolished concrete (curb & gutter, sidewalk, etc.)
    - ✓ Concrete with reinforcing OK
    - ✓ Concrete Masonry Units & Mortar
    - ✓ Minimal dirt quantities allowed with concrete
    - ✓ DO NOT place asphalt in concrete only bin.
    - ✓ Wash-out from trucks and equipment
    - ✓ All unused concrete yardage will be disposed of in designated wash-out locations to later be recycled.

- **Asphalt**
  - Disposal Method: Recycle – Dispose of in dumpster labeled "Asphalt Only"
  - Handling Procedure: Break up any wastes and put into asphalt bin. If asphalt only bin is not present on site, place acceptable materials in asphalt only pile for future recycling or disposal. Location of asphalt pile is to be determined by Contractor superintendents and foremen only.
  - Handled By Who: Asphalt Hauler X
  - Acceptable Materials:
    - ✓ Asphalt only (no concrete or other materials)

- **Scrap Metal**
  - Disposal Method: Recycle – Dispose of in dumpster labeled "Scrap Metal Only."
  - Handling Procedure: If scrap metal bin is not present on site, place acceptable materials in scrap metal only pile for future disposal. Location of scrap metal pile is to be determined by Contractor superintendents and foremen only.
  - Handled By Who: Metal Hauler X
  - Acceptable Materials:
    - ✓ Rebar (Does Not need to be straight)
    - ✓ Steel Studs
    - ✓ Embeds
    - ✓ Metal Flashing
    - ✓ Scrap Hardware (nails, bolts, etc.)

- **Paper, Cardboard, and Plastics**
  - Disposal Method: Recycle – Dispose of all paper, cardboard, and plastic products in proper bin. Small bins will be located in job trailers to collect materials that are to eventually be transferred to large site dumpster.
  - Handling Procedure: Break down all cardboard boxes flat to optimize available space in recycling bins. Remove all additional packaging materials from cardboard boxes including styrofoam and other non-recyclable materials.
  - Handled By Who: Recycling Hauler X
  - Acceptable Materials:
    - ✓ Cardboard
    - ✓ Office Paper
    - ✓ Plan Sheets
    - ✓ Plastic Packaging Material
    - ✓ Plastic Containers
    - ✓ Shrink Wrap
    - ✓ NO HAZARDOUS MATERIAL CONTAINERS ALLOWED (including paints, sealants, stains, solvents, etc.)

- **Wood Products**
  - Disposal Method: Stack reusable pieces next to saw for reuse. Place unusable wood in recycling dumpster labeled "Wood Products Only.".
  - Handling Procedure: Wood Products do not need to be stripped of nails, bolts, etc. All other trash (plastic, cardboard, etc.) attached to wood must be removed and disposed of properly.
  - Handled By Who: Wood Recycler X
  - Acceptable Materials:
    - ✓ All untreated wood
    - ✓ Wood pallets (DO NOT need to be broken down)
    - ✓ All chemically treated wood **EXCEPT** kerosene dipped woods.

EXAMPLE

IEQc3.1 - CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

Company:
Project Name:
Project Location:
Date Plan Authored:
Designated IAQ Coordinator: Site Contact

CREDIT INTENT:
Prevent indoor air quality problems resulting from the construction/renovation process and to sustain long-term installer and occupant health and comfort. This plan presents methods taken during construction that prevents future IAQ issues. It will identify applicable portions of the SMACNA Guidelines for this project as it relates to a new construction project.

STRATEGY:
Adopt an IAQ Management Plan to protect the HVAC system during construction, control pollutant sources and interrupt pathways for contamination as required to met the Indoor Air Quality credit 3.1. Sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard. Prior to occupancy and after final validation of the HVAC system and the Building Automation System, perform a prescribed building flushout or IAQ Test to achieve the additional credit, IEQc3.2.

REQUIREMENTS:
Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- ✓ During construction, meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guideline for Occupied Buildings under construction, 1995, Chapter 3.
- ✓ Protect stored on-site or installed absorptive materials from moisture damage.
- ✓ If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grilled, as determined by ASHRAE 52.2-1999. Replace all filtration media immediately prior to occupancy.

LEED SUBMITTALS:

1. Contractor's Construction Indoor Air Quality Management Plan.
2. Confirmation on air handling operation during construction.
3. Provide photographs of construction IAQ Management measures such as protection of ducts and onsite stored or installed absorptive materials.
4. Provide cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted, include chart listing filtration media changed during construction
5. (Optional) Narrative describing any special circumstances or non-standard approaches taken by the project.

Construction IAQ Management Plan
SMACNA Guidelines

(Highlighted items identify who the responsible party is)

1. HVAC Protection

   A. The most significant potential IAQ sources from construction are dust, moisture and VOCs. The approach for preventing dust-related problems is to identify all sources of dust and protect the HVAC systems. During construction, the return air system openings should have temporary filters that receive frequent periodic maintenance if the HVAC system is being utilized. When activities that produce high dust, such as drywall sanding, concrete cutting, masonry work, wood sawing and insulating or pollution levels occur, the return air system openings should be sealed off completely for the duration of the task. This activity is the responsibility of the Mechanical Contractor.

   B. If the HVAC system is not used during construction, the supply and return air system openings should be sealed off to prevent the accumulation of dust and debris in the duct system. The diffusers should also be sealed in plastic. This activity is the responsibility of the Mechanical Contractor.

   C. The mechanical rooms should not be used to store construction or waste materials. Rooms should be kept clean and neat. This activity is the responsibility of the all Subcontractors.

   D. Filtration is critical during construction and during startup of the HVAC system. Filter media needs to meet the ASHRAE requirement

for MERV Level 13. Where possible, utilize 80% dust spot efficiency filtration.

E. Upon periodic inspections during construction, if the ducts become contaminated due to inadequate protection, the ducts will be cleaned professionally. This activity is the responsibility of the Mechanical Contractor.

F. Documentation that the above guidelines are followed during the construction phase of the project, pictures will be taken daily by the Mechanical Contractor and submitted to the General Contractor. The General Contractor will also inspect periodically throughout the duration of the project.

2. Source Control

A. Use of low VOC products as indicated by the specification should be utilized to reduce potential problems. This activity will be verified and checked by the General Contractor. Reference EQ Credit 4. Materials such as caulks, sealants and cleaning products are the responsibility of the subcontractors to meet the specifications.

B. Restrict traffic volume or prohibit idling of motor vehicles where emissions could be drawn into the building. This activity is the responsibility if the General Contractor.

C. Use electric or natural gas alternatives for gasoline and diesel equipment where possible and practical. Subcontractors need to be responsible and coordinate with the General Contractor.

D. Cycle equipment off when not being used or needed. This activity will be overseen by the General Contractor. Each subcontractor will be responsible for their own equipment usage.

E. Pollution sources may be exhausted to the outside with portable fan systems. Care should be taken to ensure exhaust does not re-circulate back into the building. Subcontractors to determine needs and coordinate with the General Contractor.

F. Containers of wet products should be kept closed as much as possible. Waste materials, which can release odor or dust, should be covered or sealed. This activity is the responsibility of the General Contractor.

3. Pathway Interruption

A. Use dust curtains or temporary enclosures to prevent dust from migrating to other areas when applicable. Coordinate activity with General Contractor.

B. Relocate pollutant sources as far away as possible from supply ducts and areas occupied by workers when feasible. Supply and exhaust

systems may have to be shut down or isolated during such activity. Coordinate with General Contractor.

C. During construction, isolate areas of work to prevent contamination of clean or occupied areas. Pressure differentials can be utilized to prevent contaminated air from entering clean areas. Coordinate work with the General Contractor.

D. Depending on climate, ventilate using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC emitting materials. Schedule activities with General Contractor and Mechanical Contractor.

4. Housekeeping

A. Institute cleaning activities concentrating on HVAC equipment and building spaces to remove contaminants from the building prior to occupancy. Coordinate activities with the General Contractor.

B. All coils, air filters, fans and ductwork should remain cleaned during installation and should be cleaned prior to performing the testing, adjusting and balancing of the systems. This activity is the responsibility of the Mechanical Contractor.

C. Suppress dust with wetting agents or sweeping compounds. Use an efficient and effective dust collecting method such as a damp cloth, wet mop, vacuum with particulate filters, or wet scrubber. This activity is the responsibility of all contractors.

D. Remove accumulations of water inside the building. Protect porous materials such as insulation and ceiling tile from exposure to moisture. This activity is the responsibility of the General Contractor.

E. Provide photographs during construction of the above activities to document compliance. Responsibility of the General Contractor.

5. Scheduling

A. High pollution activities that have high VOC level products may need to be scheduled during off-hours. Activities may include products such as paints, sealers, insulation, adhesives, caulking and cleaners. Schedule activities with the General Contractor.

B. Make sure occupancy and construction do not coincide. Wait until the (2) two-week flushout is completed before occupying the building. This is activity is the responsibility of the General Contractor.

C. Conduct a minimum (2) two-week flushout with new filter media at 100% outside air after construction ends and prior to occupancy. Coordination and scheduling is the responsibility of the General and Mechanical Contractor.

MRc4 – Recycled Content Completed Full Length 3-pg LEED-Online Template

LEED-NC Retail 2.2 Submittal Template
MR Credit 4.1/4.2: Recycled Content: 10%/20% (post-consumer + 1/2 pre-consumer)

construction

(Responsible Individual) (Company Name)

I, Jane Doe, from Build-It Construction Company

verify that the information provided below is accurate, to the best of my knowledge.

SELECT OPTION

Please select the appropriate option to determine the Total Materials Cost

- ○ **Default Materials Value:** Based on the total construction costs (hard costs for CSI Master Format 1995 Divisions 2-10 only)
- ◉ **Actual Materials Value:** Based on actual materials cost (hard costs for CSI Master Format 1995 Divisions 2-10 only)

DEFAULT MATERIALS VALUE

Enter the total construction costs (hard costs for CSI Master Format 1995 Divisions 2-10 only)*	
Default materials cost (total construction cost x 0.45)	**$0.00**

ACTUAL MATERIALS VALUE

Enter the actual materials cost (excluding labor and equipment) (hard costs for CSI Master Format 1995 Divisions 2-10 only)*	**$2,170,743.00**

CREDIT COMPLIANCE

Enter the material descriptions and their corresponding recycled content information in the table below.
The combined post-consumer and pre-consumer recycled percentage should not be greater than 100%.

*For cost values do not use commas and enter numbers only i.e. enter 100000 for $100,000

Material Name	Manufacturer	Material Cost* ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Information Source	
Soffit material	Bader Burke	$9,964.00	0.00	50.00	Letter from MFR	CLEAR
Rebar	Barton Supply	$44,755.00	100.00	0.00	Letter from MFR	CLEAR
Aluminum	Horizon Glass	$24,465.00	30.00	48.00	Letter from MFR	CLEAR
Galvanized Steel Reinforcing	Soderberg Masonry	$6,447.00	0.00	99.00	Letter from MFR	CLEAR

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LEED-NC Retail 2.2 Submittal Template
MR Credit 4.1/4.2: Recycled Content:
10%/20% (post-consumer + 1/2 pre-consumer)

construction

Material Name	Manufacturer	Material Cost* ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Information Source	
Gypsum	Midwest Drywall	$4,993.00	4.00	0.00	Letter from MFR	CLEAR
Studs	Midwest Drywall	$8,893.00	23.50	6.40	MFR's Data	CLEAR
Polyisocyanurate Insulation	CEI Roofing	$100,635.00	0.00	20.00	Letter from MFR	CLEAR
EPS Insulation	CEI Roofing	$12,550.00	0.00	30.00	Letter from MFR	CLEAR
Roof Flashing	CEI Roofing	$3,600.00	20.00	40.00	Letter from MFR	CLEAR
CMU	Soderberg Masonry	$78,811.00	0.00	1.80	Letter from MFR	CLEAR
SS Stone ties	Soderberg Masonry	$6,883.00	0.00	50.00	Letter from MFR	CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR

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LEED-NC Retail 2.2 Submittal Template
MR Credit 4.1/4.2: Recycled Content:
10%/20% (post-consumer + 1/2 pre-consumer)

construction

Material Name	Manufacturer	Material Cost* ($)	Post-Consumer Recycled Content (%)	Pre-Consumer Recycled Content (%)	Recycled Content Information Source	
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR
						CLEAR

Recycled Content Calculations

Total value ($) of post-consumer content	$377,403.72
Total value ($) of pre-consumer content	$184,947.24
Total combined recycled content value ($): post-consumer + 1/2 pre-consumer	$469,877.34
Combined Recycled Content Value as a percentage of Total Materials Cost**	**21.646** %

***To qualify for the credit the percentage of recycled content (post-consumer + 1/2 pre-consumer must be at least 10% of the total materials cost*

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New Mexico Baseline LEED Scorecard

This shows credits that are most likely achievable for various certification levels

LEED for New Construction v2.2 New Mexico Baseline LEED Scorecard Project Name: Project Address: City, New Mexico		Baseline, Certified Projects	Silver Certification	Gold/Platinum Certification
Sustainable Sites	**14** Points Possible	**6**	**10**	**14**
Prereq 1	**Construction Activity Pollution Prevention**	Y		
Credit 1	**Site Selection**	1	1	1
Credit 2	**Development Density & Community Connectivity**	1	1	1
Credit 3	**Brownfield Redevelopment**			1
Credit 4.1	**Alternative Transportation**, Public Transportation Access	1	1	1
Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms		1	1
Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles		1	1
Credit 4.4	**Alternative Transportation**, Parking Capacity	1	1	1
Credit 5.1	**Site Development,** Protect of Restore Habitat		1	1
Credit 5.2	**Site Development,** Maximize Open Space			1
Credit 6.1	**Stormwater Design,** Quantity Control			1
Credit 6.2	**Stormwater Design,** Quality Control			1
Credit 7.1	**Heat Island Effect,** Non-Roof	1	1	1
Credit 7.2	**Heat Island Effect,** Roof	1	1	1
Credit 8	**Light Pollution Reduction**		1	1
Water Efficiency	**5** Points Possible	**2**	**4**	**5**
Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1	1	1
Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation		1	1
Credit 2	**Innovative Wastewater Technologies**			1
Credit 3.1	**Water Use Reduction**, 20% Reduction	1	1	1
Credit 3.2	**Water Use Reduction**, 30% Reduction		1	1
Energy & Atmosphere	**17** Points Possible	**4**	**7**	**17**
Prereq 1	**Fundamental Commissioning of the Bldg Energy Systems**	Y		
Prereq 2	**Minimum Energy Performance**	Y		
Prereq 3	**Fundamental Refrigerant Management**	Y		
Credit 1	**Optimize Energy Performance**	2	4	10
	10.5% New Buildings or 3.5% Existing Building Renovations	1	1	1
	14% New Buildings or 7% Existing Building Renovations	1	1	1
	17.5% New Buildings or 10.5% Existing Building Renovations		1	1
	21% New Buildings or 14% Existing Building Renovations		1	1
	24.5% New Buildings or 17.5% Existing Building Renovations			1
	28% New Buildings or 21% Existing Building Renovations			1
	31.5% New Buildings or 24.5% Existing Building Renovations			1
	35% New Buildings or 28% Existing Building Renovations			1
	38.5% New Buildings or 31.5% Existing Building Renovations			1
	42% New Buildings or 35% Existing Building Renovations			1
Credit 2	**On-Site Renewable Energy**			3
	2.5% Renewable Energy			1
	7.5% Renewable Energy			1
	12.5% Renewable Energy			1
Credit 3	**Enhanced Commissioning**	1	1	1
Credit 4	**Enhanced Refrigerant Management**	1	1	1
Credit 5	**Measurement & Verification**			1
Credit 6	**Green Power**		1	1

LEED for New Construction v2.2
New Mexico Baseline
LEED Scorecard

Project Name:
Project Address: City, New Mexico

		Baseline, Certified Projects	Silver Certification	Gold/Platinum Certification
Materials & Resources	**13** Points Possible	**4**	**6**	**8**
Prereq 1	**Storage & Collection of Recyclables**	Y		
Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof			
Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof			
Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements			
Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1	1	1
Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal		1	1
Credit 3.1	**Materials Reuse**, 5%			1
Credit 3.2	**Materials Reuse**,10%			
Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1	1	1
Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1	1	1
Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1	1	1
Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally			1
Credit 6	**Rapidly Renewable Materials**			
Credit 7	**Certified Wood**		1	1
Indoor Environmental Quality	**15** Points Possible	**9**	**11**	**15**
Prereq 1	**Minimum IAQ Performance**	Y		
Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Y		
Credit 1	**Outdoor Air Delivery Monitoring**		1	1
Credit 2	**Increased Ventilation**			1
Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	1	1
Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy		1	1
Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	1	1
Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1	1	1
Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1	1	1
Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1	1	1
Credit 5	**Indoor Chemical & Pollutant Source Control**	1	1	1
Credit 6.1	**Controllability of Systems**, Lighting			1
Credit 6.2	**Controllability of Systems**, Thermal Comfort			1
Credit 7.1	**Thermal Comfort**, Design	1	1	1
Credit 7.2	**Thermal Comfort**, Verification	1	1	1
Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces			1
Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	1	1
Innovation in Design	**5** Points Possible	**3**	**4**	**5**
Credit 1.1	**Innovation in Design**: Provide Specific Title	1	1	1
Credit 1.2	**Innovation in Design**: Provide Specific Title	1	1	1
Credit 1.3	**Innovation in Design**: Provide Specific Title		1	1
Credit 1.4	**Innovation in Design**: Provide Specific Title			1
Credit 2	**LEED® Accredited Professional**	1	1	1
Baseline LEED-NC Score for Certified Levels		**28**	**42**	**64**

Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69 points

LEED-NC Relative Cost and Project Phase Scorecard

LEED for New Construction v2.2
Project Phase and Relative Cost
LEED Scorecard

Project Name:
Project Address: City, New Mexico

Sustainable Sites — 14 Points Possible			Project Phase	Relative Cost
Prereq 1	**Construction Activity Pollution Prevention**		DD	0
Credit 1	**Site Selection**		Pre-Design	0
Credit 2	**Development Density & Community Connectivity**		Pre-Design	0
Credit 3	**Brownfield Redevelopment**		Pre-Design	0
Credit 4.1	**Alternative Transportation**, Public Transportation Access		Pre-Design	0
Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms		SD's	$ - $$
Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles		CD's	0 - $
Credit 4.4	**Alternative Transportation**, Parking Capacity		SD's	0 - $
Credit 5.1	**Site Development,** Protect of Restore Habitat		SD's	0 - $
Credit 5.2	**Site Development,** Maximize Open Space		Pre-Design	0
Credit 6.1	**Stormwater Design,** Quantity Control		SD's & DD's	0 - $$$
Credit 6.2	**Stormwater Design,** Quality Control		SD's & DD's	0 - $$$
Credit 7.1	**Heat Island Effect,** Non-Roof		DD's	0 - $
Credit 7.2	**Heat Island Effect,** Roof		DD's	0 - $
Credit 8	**Light Pollution Reduction**		SD's	0 - $
Water Efficiency — 5 Points Possible			**Project Phase**	**Relative Cost**
Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%		SD's & DD's	0 - $
Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation		SD's	0 - $$$
Credit 2	**Innovative Wastewater Technologies**		SD's	$ - $$$
Credit 3.1	**Water Use Reduction**, 20% Reduction		DD's	0 - $
Credit 3.2	**Water Use Reduction**, 30% Reduction		SD's & DD's	0 - $$
Energy & Atmosphere — 17 Points Possible			**Project Phase**	**Relative Cost**
Prereq 1	**Fundamental Commissioning of the Bldg Energy Systems**		CD's	$$ - $$$
Prereq 2	**Minimum Energy Performance**		Pre-Design	0 - $$
Prereq 3	**Fundamental Refrigerant Management**		SD's	0
Credit 1	**Optimize Energy Performance**		All Design Phase	
		10.5% New Buildings or 3.5% Existing Building Renovations		0 - $
		14% New Buildings or 7% Existing Building Renovations		0 - $
		17.5% New Buildings or 10.5% Existing Building Renovations		0 - $
		21% New Buildings or 14% Existing Building Renovations		0 - $
		24.5% New Buildings or 17.5% Existing Building Renovations		0 - $$
		28% New Buildings or 21% Existing Building Renovations		0 - $$
		31.5% New Buildings or 24.5% Existing Building Renovations		0 - $$
		35% New Buildings or 28% Existing Building Renovations		0 - $$
		38.5% New Buildings or 31.5% Existing Building Renovations		0 - $$$
		42% New Buildings or 35% Existing Building Renovations		0 - $$$
Credit 2	**On-Site Renewable Energy**		Pre-Design	
		2.5% Renewable Energy		$$
		7.5% Renewable Energy		$$$
		12.5% Renewable Energy		$$$$
Credit 3	**Enhanced Commissioning**		DD's	$$
Credit 4	**Enhanced Refrigerant Management**		SD's	0 - $
Credit 5	**Measurement & Verification**		DD's	$ - $$
Credit 6	**Green Power**		Any time	$ - $$

LEED for New Construction v2.2
Project Phase and Relative Cost
LEED Scorecard

Project Name:
Project Address: City, New Mexico

Materials & Resources	13 Points Possible	Project Phase	Relative Cost
Prereq 1	**Storage & Collection of Recyclables**	Programming	0 - $
Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	Pre-Design	0 - $$$
Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof		0 - $$$
Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements		0 - $$$
Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	CD's & Const.	0 - $
Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	CD's & Const.	0 - $
Credit 3.1	**Materials Reuse**, 5%	DD's	$
Credit 3.2	**Materials Reuse**,10%	SD's or DD's	$$
Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	DD's & CD's	0
Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	DD's & CD's	0 - $
Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	DD's & CD's	0
Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	DD's & CD's	0 - $
Credit 6	**Rapidly Renewable Materials**	DD's & CD's	$ - $$
Credit 7	**Certified Wood**	DD's & CD's	0 - $
Indoor Environmental Quality	**15 Points Possible**	**Project Phase**	**Relative Cost**
Prereq 1	**Minimum IAQ Performance**	SD's	0
Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Programming	0 - $$
Credit 1	**Outdoor Air Delivery Monitoring**	SD's & DD's	0 - $$
Credit 2	**Increased Ventilation**	SD's & DD's	$ - $$$
Credit 3.1	**Construction IAQ Management Plan**, During Construction	CD's & Const.	0 - $
Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	CD's & Const.	$ - $$
Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	DD's & CD's	0
Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	DD's & CD's	0
Credit 4.3	**Low-Emitting Materials**, Carpet Systems	DD's & CD's	0
Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	DD's & CD's	0 - $
Credit 5	**Indoor Chemical & Pollutant Source Control**	DD's & CD's	0 - $
Credit 6.1	**Controllability of Systems**, Lighting	DD's & CD's	0 - $$
Credit 6.2	**Controllability of Systems**, Thermal Comfort	DD's & CD's	0 - $$
Credit 7.1	**Thermal Comfort**, Design	SD's	0 - $
Credit 7.2	**Thermal Comfort**, Verification	Post-Occupanc	0
Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	Programming	0 - $
Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	Programming	0 - $
Innovation in Design	**5 Points Possible**	**Project Phase**	**Relative Cost**
Credit 1.1	**Innovation in Design**: Provide Specific Title	All Phases	0 - $
Credit 1.2	**Innovation in Design**: Provide Specific Title	All Phases	0 - $$
Credit 1.3	**Innovation in Design**: Provide Specific Title	All Phases	0 - $$
Credit 1.4	**Innovation in Design**: Provide Specific Title	All Phases	0 - $$$
Credit 2	**LEED® Accredited Professional**	Programming	0 - $$
Total LEED Scorecard			
Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69 points			

Chapter 2:

LEED Case Study:

The New Mexico Villagra Building

LEED CASE STUDY: THE NEW MEXICO VILLAGRA BUILDING

The New Mexico Villagra Building
LEED-CI Gold Certified
Historic Preservation Project

Overview

- Location: 408 Galisteo St. Santa Fe, NM
- Building Type: Commercial offices of the Attorney General
- Year Built: 1934
- Historic Restoration: Listed on the State Register of Cultural Properties
- Building Size: 3 stories - 18,180 sq. ft. (excluding 42,305 sq.ft. addition in 2004)
- Project Scope: Major interior renovation
- Urban Setting: Part of NM State Capitol Complex in Downtown Santa Fe's Historic District
- Renovation Dates: May 2004 - March 2006 completion
- Awarded LEED-CI (Commercial Interiors) Gold certification October 24, 2006
- Awarded 2007 Heritage Preservation Award for Architectural Heritage
- The Villagra Building was renamed The Paul Bardacke Attorney General Complex by Governor Richardson June 23, 2006

The LEED[1] Scorecard summary of LEED credits achieved is located at end of this Chapter.

The Villagra Building is the first building to achieve LEED Gold level certification in New Mexico and is only the third building to achieve LEED certification in the state. It is also the first public building to be LEED certified and exceeds Governor Bill Richardson's January 2006 Executive Order calling for LEED Silver certification for state buildings by one level. Because of being a groundbreaking project, pursuing LEED certification was not business as usual. It took the willingness and cooperation of the entire team to be a success.

Today, the Villagra Building is comprised of the original historic structure built in 1934 and a new structure added in 2004. The interior courtyard shows the meeting of the historic building with the new addition.

New Mexico Attorney General Patricia Madrid set LEED certification as the standard to meet her health and environmental goals as the new tenant for the Villagra Building. That matched up with Governor Richardson's goal and timing to pursue LEED certification for the first state building. Because plans were well underway for a conventional renovation when the decision to pursue LEED certification occurred, Valerie Walsh of LEED Management Services (LMS) had

LEED (Leadership in Energy and Environmental Design) is a green building rating system of the US Green Building Council whose mission is to promote environmentally sustainable practices, which result in high-performance buildings, amongst other health and atmospheric benefits.

to facilitate a quick change of course to accommodate LEED requirements. Walsh, a LEED Accredited Professional, managed and coordinated the LEED process, the design and construction team, and the LEED documentation from demolition through occupancy and certification for this first-time LEED team. The State Architect, Michael Bodelson, with NM Property Control Division (PCD), re-directed the General Contractor, Cameron Construction, who responded quickly and with the all-important buy-in.

The distinguishing features of the historic Villagra Building were preserved, such as its large double-hung windows, wrought iron railings, and brick stair treads.

The core and shell were already in place along with some finishes for the new 42,305 sq. ft. addition when LEED for the historic renovation was initiated. It was decided that the completion of that interior fit-out would be completed to meet LEED standards, though certification would not be attempted for the addition. The new and historic portions of this project are treated as separate buildings for purposes of this case study and LEED certification. This study reflects only the historic 1934 building.

BUILDING HISTORY

The Villagra Building is architecturally significant for its' Territorial Revival influence by John Gaw Meem with its brick coping, pedimented window and door surrounds, and the classically inspired columns across the front entry portal. Originally built in 1934 as The Public Welfare Building, it was the first building constructed with New Deal money in New Mexico according to the NM Heritage Preservation Alliance (NMHPA). It was named one of the "2002 Most Endangered Places in New Mexico" by the NMHPA who fought to protect it from demolition, which makes the 2007 Heritage Preservation achievement and LEED certification that much more significant.

OWNER AND OCCUPANCY

Owner:	The State of New Mexico, General Services Department
Occupants:	The Office of the New Mexico Attorney General
Occupancy:	Occupied by 31-33 people, 45 hours per person per week
Indoor Spaces:	First and second floors are primarily offices and conference rooms. Basement is permanent document storage.

TEAM & PROCESS

Design

In May 2004 the project team initially began pursuing LEED certification under the LEED-NC (New Construction & Major Renovations) Rating System. LEED-CI (Commercial Interiors) was winding down its pilot program but it had not yet been approved as a rating system. Pilot programs by their very nature tend to have less definition and they lack the benefit of a LEED Reference Guide. When the LEED-CI program released in November 2004, the project LEED Consultant compared it side by side with LEED-NC and it became clear that it was the better option for the project. The Villagra Building was the 24th project to register with the US Green Building Council for the new LEED-CI program indicating leadership in a new field.

The LEED-CI Reference Guide was not available until summer 2005. Because there were many new credit points and referenced standards, it was challenging at times making design decisions with only the basic Rating System description which lacks the clarity and detail of the LEED Reference Guide.

Primary LEED Project Team members are listed in Appendix I of this chapter, following the LEED Scorecard.

LEED Highlights and Details of the Project

The LEED Rating System is comprised of 5 main areas of building practices. How the project achieved sustainability in each of these areas is detailed in the following pages of this Chapter. There are instances where sustainable practices were followed regardless of whether it earned a LEED point or not.

Sustainable Sites

Site characteristics that impact the environment include location as it affects transportation needs; surface areas and how pervious they are for stormwater runoff as well as reducing the heat island effect; protecting topsoil; connection with community; and management of light spillage from a property in relation to night-sky pollution. –LMS

Highlights

- Designated Preferred Parking for low-emitting and fuel efficient vehicles
- Bicycle racks and showers provided to encourage alternative transportation
- Building location affords easy access to multiple bus routes, encouraging alternative transportation use and reduced parking needs
- Building location affords easy access to multiple community services and residential areas which encourages walking
- Low Environmental Impact Integrated Pest Management policy instituted
- Use of Entryway System to reduce exposure of occupants to hazardous contaminants
- Parking capacity does not exceed local zoning requirements
- Priority parking provided for van and carpools

Signs in the parking lot designate preferred parking for hybrids and other low-emitting & fuel-efficient vehicles.

[2]LMS references general background information on the LEED credits written by LEED Management Services

Site Description:
Lot size 1.48 acres
Building footprint: 5,884 sq. ft.
Previously developed land

The original parking lot containing 89 parking spaces remained unchanged despite the addition of the new 4-storey 42,305 sq. ft. wing. The city bus line has two routes which run within a ¼ mile of the building serving as an alternate transportation option. Van and carpools, which is a state policy, have preferred designated parking in the lot. Use of van and carpools reduces pollution and land development impacts from single occupancy vehicle use. The downtown location of the Villagra building affords easy access to multiple community services as well as a residential district which encourages walking.

Bicycle racks have been added to encourage alternative transportation, along with showers and changing facilities located in the Bataan Building across the street. Only 2 bike racks are required to accommodate 5% of the 31 full-time employees of the historic Villagra Building, and the remainder are used for the Villagra addition and neighboring Bataan Building.

5 parking spaces have been designated with signage as Preferred Parking for low-emitting and fuel-efficient vehicles, which represents 5% of the total parking. The NM Building Services Division (BSD) requires a permit to park in these preferred parking stalls.

The Building Services Division was very receptive to creating an Integrated Pest Management (IPM) Plan for the Villagra Building which has since been implemented in all state buildings as a direct result of this LEED project. BSD discovered the use of alternative means to manage pests that do not require the use of harmful chemicals or insecticides. They conducted experiments with vinegar and water as an alternative to herbicides, and a 20% dish soap/40% alcohol/40% water mix as a deterrent for ants. BSD also moved to snap traps for mice which avoids the use of glue traps or mouse baits which contain harmful chemicals.

The concrete surface of the central courtyard reduces the project's contribution to the heat-island effect with its light-colored, high albedo characteristic. The building's lighting was also designed to limit the amount of light pollution leaving the site. Preserving the historic building avoided enormous amounts of construction waste from going to the landfill had it been demolished, and reduced the need for virgin resources to construct a new building. It also preserved an architecturally significant property, contributing to the integrity of the historic community.

ENERGY AND ATMOSPHERE

Overview

As a result of the new high-performance energy-related equipment and envelope improvements made in the renovation, the Villagra Building now performs 31% better than the ASHRAE 90.1-2004, Appendix G requirement using the Energy Cost Budget (ECB) methodology. This earned two LEED points for Optimized Energy Performance for HVAC. Both the budget and energy cases were modeled using "Carrier's" E20-II HAP (version 4.2), an energy simulation program, created by Carrier Corp which calculates the heating and cooling loads and simulates building energy usage for each hour of the year.

New compact boiler plant.

Energy highlights consist of a new four-pipe fan coil HVAC system with heat recovery, variable speed drives on ventilators, and a complete Direct Digital Control (DDC) system. It also incorporates room by room occupancy sensors for both HVAC and lighting, and has daylighting controls which dim when natural daylight is sufficient. The mechanical system also includes the capacity to operate in "economizer" mode, which provides space conditioning using 100 percent outside air when outdoor conditions are suitable, as well as providing the means to perform the preoccupancy air purge[3]. Specifics on these features follow.

HVAC System

Highlights

- Energy performance is 31% better than the ASHRAE 90.1-2004 standard
- New four-pipe fan coil HVAC system has Energy Recovery Units (ERUs) which capture waste heat from ventilation exhaust
- New HVAC system operates only when occupancy sensor determines that the room is occupied, saving heating and cooling energy
- New HVAC system can operate in "economizer" mode using 100% outside air rather than signaling for heat or cooling, thereby saving energy
- Complete DDC (Direct Digital Control) system controls room temperature and ventilation and responds to CO_2 sensors to elevate air supply
- New high efficiency boiler installed

HVAC units fit compactly into office closets as a result of creative problem-solving by the mechanical contractor and team. Fan coil units consist of a fan, heating and cooling coil, and filter.

The hurdle to this point occurred when the Department of Cultural Affairs, Historic Preservation Division, objected to the proposed single large air handling unit on the roof for the variable air volume (VAV) system. This entailed a challenging, but creative re-design of the system to fit smaller units compactly into the building without compromising valuable office space. Smaller Energy Recovery Units (ERUs) were located on the roof, reducing the visual impact.

Fan coil units are used for heating and cooling. Chilled water from the chiller plant provides cooling, and heating water from the boiler plant provides heating. Ventilation is provided through an outside air distribution system which supplies air directly to the return air ducts for each fan coil unit. The outside air system employs energy recovery ventilators to pre-heat or pre-cool outside air to reduce expenditure of metered energy.[4]

The building has a new Direct Digital Control (DDC) system that controls room temperature and ventilation. It also responds to CO_2 sensors when increased air supply is called for. The HVAC system also is informed by an occupancy sensor whether there is someone in the room or not and reduces the energy demand as necessary. Another feature is that the system can operate in "economizer" mode using 100% outside air when conditions are favorable, rather than signaling for heat or cooling, thereby saving energy.

The steam boilers installed in the 1960s were replaced with a high-efficiency boiler in this project.

New four-pipe HVAC installation in the basement ceiling.

[3,4]M&E Engineering EAc1 narrative

Products Used

HVAC Controls:

Control Device Make/Model: Watt Stopper CX-100
Control Method: Occupancy Sensor
Control Type: Passive Infrared Occupancy Detector/Sensor

Lighting Controls and Daylighting

Highlights

- High efficiency lighting achieves 28% reduction below the ASHRAE 62.1-2004 standard
- Lighting occupant sensor controls switch off lights for unoccupied spaces reducing energy needs for light and associated cooling
- High-efficiency lighting system includes auto-dimming feature when natural daylight is sufficient

The hurdle to the successful implementation of this credit was transitioning occupants accustomed to working with only artificial ambient ceiling light to working with reduced density ambient ceiling light which was designed to work in conjunction with desk task lighting. This was remedied by ordering task lights after move-in which then met the design intent.

Lighting consists primarily of direct/indirect pendant-mounted fluorescent fixtures in offices and other occupied rooms, and compact fluorescent fixtures in hallways and other support spaces. Every office has at least one large operable window.

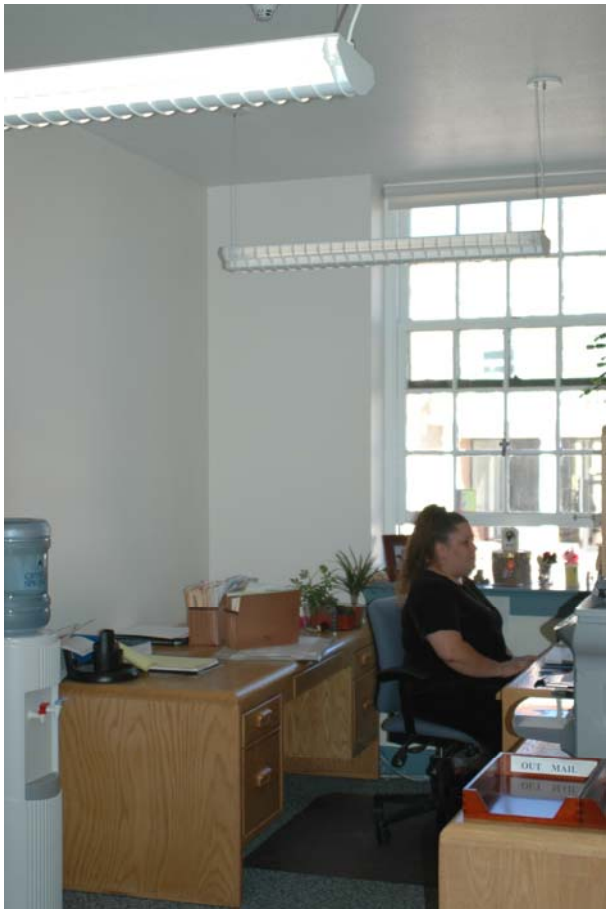
High Efficiency Lighting:

The average lighting power density for this project is 0.659 W/sf versus 0.921 W/sf allowed by the ASHRAE 90.1-2004 standard using the Space Area Method. This is a 28% reduction below the minimum compliance level.

The building is made up of small rooms and the lighting in each room is controlled by a wall-mounted switch. These individual controls save energy over large zone lighting that is either all on or all off.

Lighting Occupant Sensor Controls:

The private office spaces use lighting occupant sensor controls to switch off the lighting when offices are unoccupied, saving energy from both the lights and for the associated cooling necessary from heat generated by continuous lighting. This project has earned a 10% lighting power density credit for occupant sensor controls in the private offices. By applying this modeling methodology, occupant sensor control credits in the building reduce the lighting power density from 0.659 W/sf to 0.593 W/sf.



Offices in the Villagra Building feature operable windows for daylight and ventilation. Daylighting sensors illuminate the lights farthest from the window, while the lights closest to the window are automatically turned off or dimmed to save energy.

Daylighting Controls:

The high-efficiency lighting system includes an auto-dimming feature that responds by dimming individual lights when natural daylight is sufficient. The daylight responsive controls are installed in all regularly occupied spaces within 15 feet of windows. The fluorescent lighting fixtures are equipped with daylight harvesting ballasts that are also continuously dimmable and include a light level sensor (photosensor). The light level to be controlled by the sensors was set in the field.

Products Used:

Lighting Controls:

Control Device Make/Model: LECS-Dimmer
Control Method: Continuous Dimming
Control Type: Sensor

Control Device Make/Model: Watt Stopper CX-100
Control Method: Occupancy and Light Sensor
Control Type: Passive Infrared Occupancy Detector/Sensor

Building Envelope

Highlights

- R-30 in roof achieved by adding 2" (R-14) of EPS insulation to top floor ceiling interior
- R-11 insulation added to interior surface of exterior concrete walls
- Original 1934 double-hung single glazed windows' thermal performance is enhanced with high-tech ceramic film while retaining historic character

The original windows and doors from 1934 were retained as significant elements for historic architectural integrity and as part of the NM Heritage Preservation Alliance agreement with the State. The wood windows are large double-hung, single glazed units with TDL's (true divided lites) that were refurbished in this renovation to be operable. The thermal attributes were improved dramatically by adding a high-tech film called Huper Sech to the inside of the glass. It is not a low-e film product. This nano-ceramic mineral film has excellent thermal properties such as reflecting up to 70% of outside solar heat to keep the cooling energy demand lower in summer, while blocking up to 98% of all infra-red radiation for retaining interior heat in winter.

Additionally, the Huper Sech product was selected because it did not have the metallic, shiny characteristics of the low-e film sample, nor did it darken the interior offices. This ceramic film stays non-reflective both day and night and is not tinted. These features were extremely important for preserving the historic and traditional character of the building.

The existing monolithically poured exterior concrete walls had no insulation and were furred out to accommodate R-11 fiberglass batt insulation on the inside surface. 2" (R-14) of rigid insulation (EPS) was added to the inside of the ceiling of the top floor to bring the R-value up to 30, or twice the required level. Insulation is typically added on the exterior surface but this roof was still serviceable and re-roofing would have been costly and unnecessary.

Products Used

Window Film:
Huper Sech by Huper Optik
A Nano-Ceramic mineral film (not low-e)

Thermal properties of the original windows were improved by applying a high-tech ceramic film called Huper Sech to the interior glass surface.

Commissioning of the Energy Systems

Highlights

- Third-party commissioning of the energy systems verifies owner's project requirements are met and equipment is installed and performs as designed
- Enhanced commissioning of the energy systems includes post-occupancy assessment and recommendations for remedies

A third-party commissioning authority (CxA) was included as part of the LEED team to "verify that the energy-related systems of the building were installed, calibrated, and performed according to the Owner's Project Requirements (OPR), Basis of Design (BoD), and construction documents"[5].

Enhanced Commissioning of the energy systems was also performed that includes a post-occupancy assessment and recommendations for remedies.

We found the CxA to be an extremely valuable team member in providing observations and constructive feedback to both the design and work-in-progress. Our CxA attended many weekly onsite construction meetings and made regular inspections which contributed to a better project outcome.

Green Power and Atmospheric Features

Highlights

- 100% clean, renewable wind power was purchased to offset carbon emissions (CO_2) from electricity use for 2 years
- Carbon emissions were reduced by approximately 192,000 lbs. annually for two years through Green Power purchase of wind energy
- The carbon footprint of 250,000 lbs for electricity was reduced annually by 100%; 58,000 lbs. was avoided through efficiency measures and 192,000 lbs was offset by purchasing wind power credits
- 61% savings of natural gas through efficiency measures translates to saving 25,000 lbs. of CO_2 annually
- No ozone-depleting CFC-based refrigerants were used in the existing 10-year old chiller system

Clean, renewable energy from PNM's SkyBlue wind energy program was purchased to offset carbon emissions for 100% of the electrical requirements for this building for two years. The energy analysis model prepared for LEED EAp2 and EAc1.3 was used to calculate the projected kWh's of green power needed.

It was estimated that this Green Power purchase reduces the building's carbon emissions by approximately 192,000 lbs per year of actual electrical usage. It avoided 58,000 more lbs. of CO_2 from the energy saved through the energy efficiency measures implemented and the new high-performance HVAC system. The carbon footprint for natural gas of 41,000 lbs of CO_2 for the baseline case was reduced by 25,000 lbs to 16,000 lbs of CO_2 through energy efficiency measures.

The existing 10-year old chiller remains and is CFC-free. An investigation was made to see if the chiller's HCFC 22 could be eliminated with a modification, but it was not possible on this unit.

Wind turbine photo courtesy PNM.

[5]LEED Reference Guide EAp1

Other Energy Saving Features

Highlights

- Variable speed drives on ventilators save energy over typical single speed fans

WATER EFFICIENCY

Highlights

- Projected landscaping water savings of 79%, or 55,000 gallons per year

The existing landscaping in the central courtyard beds were planted with drought-tolerant species. The old irrigation system consisted of a simple electronic clock-driven, programmable controller that watered on a set schedule, regardless of conditions or need. The LEED upgrade replaced that controller with a six-zone high efficiency irrigation system with moisture sensors and satellite weather tracking. This new "Weathertrak" unit receives wireless information from the weather network allowing water usage to be shut off when it is, has recently, or will soon be raining or precipitating. The previous annual usage was 72,000 gallons per year (gpy). The projected usage with the Weathertrak unit is 17,000 gpy, for a savings of 55,000 gpy.

A high-efficiency satellite irrigation system is projected to save more than 50,000 gallons of water per year.

All interior plumbing was removed from the 1934 Villagra Building in this renovation project. All restrooms and break rooms are now located where the historic building and the new addition are connected.

Product Information:
WeatherTrak
Irritrol Model SD600-INT

MATERIALS AND RESOURCES

The choice of materials used on a project has a significant impact on how sustainable a building will be. Careful attention to extraction, manufacture, and transport of materials, as well as the proper disposal of waste, can significantly reduce the impact a construction project has on the environment. - LMS

Storage and Collection of Recyclables

Highlights

- Occupant recycling policy instituted for cardboard, plastic, metal, glass, and all paper

The hurdle for this prerequisite was that state operating budgets are planned and approved a year or more in advance and NM Building Services Division (BSD) had funds allocated only for waste services and no recycling services.

The Environmental Protection Agency estimates that "about 80% of what Americans throw away is recyclable, yet our recycling rate is just 28%."

Occupant waste recycling is a Prerequisite for LEED projects. The LEED consultant calculated how much of each waste stream could be recycled, worked with City of Santa Fe Solid Waste on a plan for pickup services, and approached the Attorney General's Office about covering this specific cost out of their own budget. Because of her commitment to LEED certification, Attorney General Madrid agreed. The Villagra is the first state building to recycle more than just paper and serves as a pilot program for future buildings.

After learning more about the benefits of recycling during this project, BSD initiated the corrugated cardboard recycling and was pleased to learn that it did reduce waste and associated costs. Boxes were previously being thrown in the dumpster un-flattened taking up costly cubic feet of dumpster space that filled them prematurely. BSD made the decision to implement cardboard recycling at the five largest state buildings, at a minimum, as a result of this LEED project.

The LEED-CI Reference Guide has several very useful calculators (that oddly, LEED-NC does not have) for estimating occupant recycling waste per business type, per person, and type of waste; another for calculating recyclable container volume; and a third for determining the recycling area needed. Projects that design and plan right down to the container model, placement, and storage areas for specific containers will have a higher rate of success in the recycling effort.

Tenant Space - Long Term Commitment

Highlights

- The building has been dedicated as the Attorney General Complex on a long term "lease" exceeding 10 years

Long-term leases reduce the frequency of relocating and associated construction activities. It also conserves resources and reduces the environmental impacts of tenancy as they relate to materials, manufacturing, and transportation.[6]

The Villagra Building was renamed the Paul Bardacke Attorney General Complex in June 2006. This building is now large enough to house all AGO Santa Fe staff and visiting attorneys together in one building and provides the necessary building security systems and confidentiality features designed specifically for the Office of the Attorney General.

Construction Waste Management

Highlights

- 82% of demolition and construction waste was recycled or diverted from the landfill, or 195 tons

Construction waste makes up approximately 40% of the landfill waste in the United States.[6] *Construction waste recycling reduces the loss of valuable materials, allowing those materials to be used again productively, avoiding the harvest of virgin natural resources. It also conserves on the amount of landfill space needed for waste thereby preserving valuable agricultural or urban real estate. -LMS*

The hurdle for this credit was that the NM gypsum manufacturer did not accept clean scrap gypsum board back for recycling creating a challenge for the project's waste recycling goals

Roll-offs in the parking lot of the building enabled construction crews to separate waste for reuse and recycling, contributing to an overall construction waste reduction of 82%.

[6]USGBC LEED-CI Reference Guide, page 202
[7]USGBC LEED-NC Reference Guide, page 233

Bi-lingual signage for construction waste recycling bins is instructive for successful separation.

for this material. Soils here are not suitable using it as a soil amendment, as in other states.

Another hurdle for this credit was educating Subcontractors, and then reminding their labor force in the weekly Safety meeting, to separate construction waste. When staff changes occurred, they needed to be oriented to the procedure. While it was not difficult, it did take diligence.

Cameron Construction prepared an Estimated Waste Plan which helped anticipate what the waste stream would be and generated the source list for recycling and diversion. This was in addition to preparing a Construction Waste Management Plan. Materials were returned to the manufacturer wherever possible, offered to site workers, the Owner, or donated to charity. The state did make good use of many pipe fittings and fixtures for other buildings. Separating copper from other metals is a worthwhile task as it sells for much more. Copper paid $0.10/lb. when other metals were paying only $0.01/lb.

Waste materials from the project are listed below with sources for recycling or reuse:

Concrete and brick
L&L Waste Services, Santa Fe

Metal and Cardboard
Capitol Scrap Metal, Santa Fe

Plastic, copper & aluminum, paper
City of Santa Fe Recycling Center

Interior Doors
Habitat for Humanity
Santa Fe Raptor Center

Asphalt (from parking area)
Reworked on site

Resource Reuse

Highlights

- Original 1934 doors, windows, and some lighting fixtures were refurbished and reused to save on virgin natural resources, and carbon emissions and fossil fuels related to their manufacturing and transportation
- 83% of office furniture and furnishings were reused to conserve resources

The building's original doors were reused.

Recycled Content Materials

Highlights

- Recycled content building materials were selected wherever possible

The gypsum wallboard is a regionally mined material, with a low recycled core content of 6% (pre-consumer). The paper backing is 100% recycled content (95% pre-consumer; 5% post-consumer). Gypsum risers were used for shipping in place of wood palettes.

Medex MDF (medium density fiberboard) was the composite wood product of choice used for door jambs, shelving, window and door casing, sills, base trim, and crown moulding and contains 100% pre-consumer recycled wood fiber and has no added urea-formaldehyde.

The steel studs contain 31% recycled content and were manufactured regionally. The recycled content in the fiberglass insulation is 30% post-consumer content.

Regional Materials

Highlights

- Local/regional materials were selected to reduce environmental transportation impacts and support local economy

Sustainably Harvested Wood

Highlights

- Forest Stewardship Council (FSC) certified wood from sustainably managed forests, was used in all new doors and conference tables

Managing our forests so that they provide ecological resources such as clean water, clean air and a habitat for wildlife and indigenous peoples, while still providing wood for construction and other uses is a goal of the Forest Stewardship Council (FSC). To support sustainable forestry, so that all generations can enjoy our natural resources as we do today, the Council created standards for proper management of forests. Companies that manage their forests to these standards can have those forests certified, and the products of those forests are stamped to indicate that they are FSC certified. The Council also certifies companies as "Chain-of Custody" certified, to ensure that FSC certified wood is properly tracked through each stage, giving customers the confidence that their wood was harvested from a sustainably managed forest. -LMS

The Villagra Building specified FSC certified wood in all of the new doors, as well as the new conference tables.

Green Products Used in the Villagra Building

Medex by Sierra Pine
Urea formaldehyde-free MDF
100% Pre-consumer recycled content
Application: door jambs, window & door casing, base trim, window sills, crown moulding, shelving

Karona Doors
FSC certified wood
Urea formaldehyde-free core and resin
Low-VOC glue, recycled content core

Haworth Office Furnishings
GreenGuard certified furnishings (low VOC)
Recycled content upgrade option available
FSC certified wood in conference tables

Milliken Carpet Tiles
Low-VOC
CRI Green Label Plus certified

Owens Corning Fiberglass Insulation
GreenGuard Certified fiberglass batts (low VOC's)
Some recycled content

Gorilla Glue
Low-Voc wood glue

Dunn-Edwards/Wellborn
Low-VOC primer, paints, and drywall sealer

Johns Manville Fiberglass Insulation
Urea formaldehyde-free pipe insulation
Recycled content

Mapei, Inc.
Ultra/Bond ECO 800
Low-VOC carpet adhesive

American Gypsum, Albuquerque
Recycled content drywall
Local/regional/extracted material

Metal Studs
Dietrich Metal Framing
Recycled content, Local/regional material

INDOOR ENVIRONMENTAL QUALITY

Recent studies have shown that occupants of green buildings are generally healthier, happier and more productive than those in traditionally built buildings. Whether it is school children, workers, or retail consumers, there is strong evidence that more natural light (through daylighting), more fresh air, and the presence of fewer harmful chemicals improves productivity and reduces absenteeism and staff turnover. -LMS

High-Performance Ventilation System

Highlights

- Healthy indoor air quality achieved through the high-performance fresh air ventilation system
- Ventilation system operates at 30% above the ASHRAE 62.1-2004 standard

The building has improved ventilation of 30% above ASHRAE Standard 62-2004, the LEED Prerequisite. The fan coil units are modulated by the HVAC control system from the signal of a CO_2 sensor located in one space of each control zone to provide minimum preset ventilation upon occupancy. When there are no occupants, the system automatically changes to unoccupied mode maintaining setback conditions, fan off and valves closed. Further details are covered in the HVAC section of this Chapter.

Indoor Air Quality Management Plan (IAQ) - During Construction

Highlights

- Indoor Air Quality (IAQ) Management Plan during construction minimized hazardous IAQ conditions from work operations for workers and future occupants
- HVAC system was not run during construction and fan coils and ducts were protected from dust, dirt, and moisture

Ceiling ducts were protected with plastic from dust and moisture during construction.

Consideration was given to control the indoor air quality conditions that are created from the work operations during construction and to protect the HVAC duct system from moisture and particulate matter prior to start-up. The LEED consultant provided the Contractor with a sample IAQ Management Plan During Construction which was modified to suit this project. It includes Control Measures of the SMACNA IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

Some of those features are: a no smoking policy inside building; only low-emitting materials are allowed onsite and must be verified by the superintendent; well-ventilated conditions to be maintained and dust minimized with control measures such as a cut room; mechanical systems not to be used for any temporary air treatment during construction; and all equipment air openings to be sealed immediately following installation.

Construction Indoor Air Quality Management Plan - Before Occupancy

Highlights

- A whole-building fresh-air purge was conducted prior to occupancy for healthy indoor air quality

The intent of this LEED credit is to reduce IAQ problems from construction materials and new furnishings such as formaldehyde, particulate matter, VOC's, Carbon Monoxide, and 4-PCH.

The hurdle for this credit initially was the filter size and the two-week time requirement for the fresh air purge.

The requirements for this credit were revised by the USGBC during the course of this project, offering LEED-CI a new option for a staged fresh-air purge, or flush-out. Prior to that, in LEED-NC, the credit required a full two weeks for the fresh-air purge with the building unoccupied and using only the thicker MERV 13 filters, which our HVAC system could not accommodate. This point was initially ruled out. The two week move-in delay for the Attorney General was also going to be a tough sell. Prior to the credit revision, the plan was to pursue Option B: IAQ Test Procedure and gamble that it passed the first time around. Under LEED-CI, the staged fresh-air purge could be completed for occupancy, in this case, in just 7 days and the MERV filter size was reduced to 8, which quickly changed the plan. The HVAC system's ability to operate in economizer mode contributed to moving the required 14,000 cubic feet of outdoor air per square foot in less time.

Low-Emitting Materials

Highlights

- Healthy indoor air quality achieved using non-toxic and low-VOC (volatile organic compounds) materials
- Carpet Systems meet VOC requirements of CRI's Green Label Plus program
- Composite wood products contain no added urea-formaldehyde, a known carcinogen and irritant
- Greenguard IAQ Certified furnishings are low-emitting and have low-VOC content
- Green Housekeeping policy uses non-toxic cleaning products and methods (covered in Innovations credit)

The hurdle to this credit for the Contractor was the time associated with identifying and locating materials and products new to them and the Subcontractors. More careful supervision was also required for all products brought on-site during construction.

Volatile Organic Compounds (VOCs)

Volatile organic compounds are toxins that are often found in carpets, paints, adhesives, and prolonged exposure. Urea-formaldehyde in resins of composite wood products is a known carcinogen when present in high concentrations. In lower concentrations, urea-formaldehyde can cause burning sensations in the eyes, nose and throat; coughing; chest tightness; wheezing; and asthmatic and allergic reactions. -LMS.

Only low-emitting materials were used in the Villagra Building renovation. All of the paints, adhesives and sealants used on the interior, including most of the exterior of the building, are low-VOC. Additionally, all carpet used meets the requirements of the Carpet and Rug Institute's Green Label Plus program, which includes extensive testing to ensure low-VOCs.

Low-emitting Medex MDF was used in the window sill above and in other interior trim and has no added urea-formaldehyde and is 100% pre-consumer recycled content.

Medex MDF (medium density fiberboard) was the composite wood product of choice used for

The Villagra Building project specified low-emitting materials, including office furniture and finishes.

Haworth, the furniture manufacturer for the project, removed all of their own cardboard and Styrofoam packaging waste from the jobsite for recycling.

door jambs, shelving, window and door casing, sills, base trim, and crown moulding and contains 100% pre-consumer recycled wood fiber and has no added urea-formaldehyde. Its stability and consistency were also attractive features.

Materials associated with this credit are listed under Materials and Resources in this Chapter.

Fresh Air

The Villagra Building was designed with sensors to ensure a healthy supply of fresh air for occupants at all times. The sensors include airflow monitors that ensure the minimum required flow rate is maintained (according to ventilation standard ASHRAE 62.1-2004), as well as CO_2 monitors for densely occupied spaces, which automatically turn on the ventilation system if CO_2 levels get too high.

Particulates

Particulates are small particles of solids and liquids that float in the air. Particles smaller than 10 microns in diameter (about 1/7 the thickness of a human hair) are of the greatest concern to human health, causing or aggravating asthma, bronchitis and other lung diseases, especially in sensitive individuals such as children, those with asthma, and the elderly - LMS

Two methods were used to reduce the particulates in the Villagra Building. The first was entryway walk-off mats, which collect the particulate brought into the building on people's shoes. This helps to reduce the amount of particulates from entering the building and possibly becoming airborne. The second method used to reduce particulates was through the use of MERV 8 filters in the ventilation system. MERV 8 filters are slightly thicker in depth than standard MERV 6 filters and remove twice as many particulates in the 3.0 to 10.0 micron range.

Daylighting and Views

Highlights

- Natural daylighting improves light quality, reduces artificial lighting and cooling requirements, creates a connection to the outdoors, and improves worker productivity

Views to the outdoors are an important point of connection to the rhythms of time of day, to weather and seasonal activity, and to nature – LMS

The Villagra Building is graced with large, double-hung windows in every office attributable to the timeless architectural style known as the double-loaded hallway. These windows contribute to the natural daylighting (which reduces energy needed for lighting and cooling), connection to the outdoors, and fresh air supply.

Environmental Tobacco Smoke

Highlights

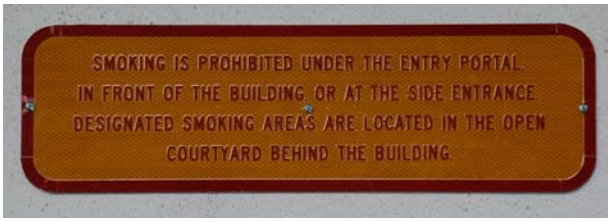
- This No-Smoking Building has a designated Smoking Area located a minimum of 25' away from entries, operable windows, and intake vents

Environmental Hazards Remediation

Highlights

- The renovation addressed environmental hazards such as asbestos, radon, lead paint, halons, and PCBs

As part of the LEED goals to ensure occupant health and safety, environmental hazards were addressed. An asbestos abatement occurred in two phases both before and during the interior demolition work. Lead paint was abated where construction would make it airborne and was contained where it remains until budgets can be established for remediation. Air sampling tests performed for mold were negative. A radon mitigation system was repaired. Halons have been safely removed and PCBs are no longer in the building.



Upper left photo shows signage placed at the two locations where smoking is permitted on the property. Photo above shows signage posted at main building entries directing smokers to the designated smoking area. Photo at left shows designated smoking area with benches, signage, and waste cans.

Environmental hazard remediation during the renovation ensures healthy indoor air quality for the building.

INNOVATIONS

Green Housekeeping

Highlights

- Green Housekeeping policy uses non-toxic cleaning products and methods
- Environmentally Preferable Purchasing (EPP) policy instituted for housekeeping paper products
- Green Housekeeping program became policy for all state buildings as a result of this LEED project

NM Building Services Division implemented a "Green Housekeeping" program for this credit, which combines guidelines for purchasing non-hazardous cleaning products (including a list of prohibited products) that comply with Green Seal Standards (or California Code of Regulations) for green cleaning, and a training program for custodial staff in the proper procedures for cleaning with the new products, procedures and equipment.

Environmentally Preferably Purchasing Policy (EPP)

Highlights

- Environmentally Preferable Purchasing (EPP) policy instituted for office paper, products, and supplies

Products that we use everyday can be environmentally harmful beginning with the extraction, the manufacturing process, transportation, use, and finally disposal. By purchasing EPPs, we look to reduce those impacts, some of which can be severe. EPPs are products or services that *have a lesser or reduced effect on human health and the environment when compared with competing products or services. Such products or services may include those which contain recycled content, minimize waste, conserve energy or water, and reduce the amount of toxics either disposed of or consumed.*[8]

The Villagra Green Housekeeping Program includes an environmentally preferable purchasing policy, specifying paper toweling, toilet and tissue products with high recycled content that are non-chlorine bleached.

The EPP for the Attorney General's office includes environmental preference for paper products and office supplies; Energy Star computers, monitors, and printers; photocopier equipment; and toner cartridges, amongst others.

Green Power

Highlights

- Green Power: 100% clean, renewable wind power was purchased to offset carbon emissions (CO_2) from electricity use for 2 years
- Carbon emissions are reduced by approximately 192,000 lbs. through Green Power purchase of wind energy

The Villagra Building has purchased renewable energy credits from wind for 100% of their projected electricity use for two years. This level of renewable energy credits qualifies as "Exemplary Performance" by the USGBC's LEED-CI program. A fuller description can be found under "Green Power and Atmospheric Features" in the Energy and Atmosphere category earlier in this Chapter.

LEED Accredited Professional

Highlights

- An experienced LEED Accredited Professional coordinated and managed the LEED process, team, and documentation

The Attorney General initiated the hiring of LEED consultant, Valerie Walsh of LEED Management Services (LMS) to educate, coordinate and guide the project team through the LEED certification process, to act as a sustainability advocate for all team members, and to manage LEED documentation and certification submittals to ensure compliance with LEED requirements.

The LEED consultant managed the design and construction team collaboration critical to the integrated design process which is the cornerstone of the LEED process.

A project team meeting on-site during construction typically included the construction project manager and superintendent, owner, tenant, commissioning agent, architect, engineer, LEED consultant, and various subcontractors.

[8]Environmental Protection Agency (EPA)

LEED
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

New Mexico Villagra Building

LEED for Commercial Interiors Version 2.0
Santa Fe, New Mexico
Project #10002476
Awarded 24 October 2006

Certified 21-26 points Silver 27-31 points Gold 32-41 points Platinum 42-57 points

33 Points Achieved — **57** Points Possible

5	**Sustainable Sites**	**7** Points Possible	
1	Credit 1	**Site Selection**	
1	Credit 2	**Development Density & Community Connectivity**	
1	Credit 3.1	**Alternative Transportation**, Public Transportation Access	
1	Credit 3.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	
1	Credit 3.3	**Alternative Transportation**, Parking Availability	
0	**Water Efficiency**	**2** Points Possible	
	Credit 1.1	**Water Use Reduction**, 20% Reduction	
	Credit 1.2	**Water Use Reduction**, 30% Reduction	
7	**Energy & Atmosphere**	**12** Points Possible	
Y	Prereq 1	**Fundamental Commissioning**	
Y	Prereq 2	**Minimum Energy Performance**	
Y	Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2	Credit 1.1	**Optimize Energy Performance**, Lighting Power	
1	Credit 1.2	**Optimize Energy Performance**, Lighting Controls	
2	Credit 1.3	**Optimize Energy Performance**, HVAC	
	Credit 1.4	**Optimize Energy Performance**, Equipment & Appliances	
1	Credit 2	**Enhanced Commissioning**	
	Credit 3	**Energy Use**, Measurement & Payment Accountablity	
1	Credit 4	**Green Power**, 50% for 2+ years	
6	**Materials & Resources**	**14** Points Possible	
Y	Prereq 1	**Storage & Collection of Recyclables**	
1	Credit 1.1	**Tenant Space,** Long Term Commitment	
	Credit 1.2	**Building Reuse**, Maintain 40% of Interior Non-Structural Components	
	Credit 1.3	**Building Reuse**, Maintain 60% of Interior Non-Structural Components	
1	Credit 2.1	**Construction Waste Management**, Divert 50% from Landfill	
1	Credit 2.2	**Construction Waste Management**, Divert 75% from Landfill	
1	Credit 3.1	**Resource Reuse**, 5%	
1	Credit 3.2	**Resource Reuse**,10%	
1	Credit 3.3	**Resource Reuse**, 30% Furniture & Finishings	
	Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	
	Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	
	Credit 5.1	**Regional Materials**, 20% Manufactured Regionally	
	Credit 5.2	**Regional Materials**, 10% Extracted & Manufactured Regionally	
	Credit 6	**Rapidly Renewable Materials**	
	Credit 7	**Certified Wood**	

10	**Indoor Environmental Quality**	**17** Points Possible	
Y	Prereq 1	**Minimum IAQ Performance**	
Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	
1	Credit 1	**Outdoor Air Delivery Monitoring**	
	Credit 2	**Increased Ventilation**	
1	Credit 3.1	**Construction IAQ Management Plan**, During Construction	
1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	
1	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	
1	Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	
1	Credit 4.3	**Low-Emitting Materials**, Carpet Systems	
1	Credit 4.4	**Low-Emitting Materials**, Composite Wood & Laminate Adhesives	
1	Credit 4.5	**Low-Emitting Materials**, Systems, Furniture & Seating	
	Credit 5	**Indoor Chemical & Pollutant Source Control**	
1	Credit 6.1	**Controllability of Systems**, Lighting	
	Credit 6.2	**Controllability of Systems**, Temperature & Ventilation	
	Credit 7.1	**Thermal Comfort**, Compliance	
	Credit 7.2	**Thermal Comfort**, Monitoring	
	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	
	Credit 8.2	**Daylight & Views**, Daylight 90% of Spaces	
1	Credit 8.3	**Daylight & Views**, Views for 90% of Seated Spaces	
5	**Innovation & Design Process**	**5** Points Possible	
1	Credit 1.1	**Innovation in Design**: Resource Reuse, Greater than 40%	
1	Credit 1.2	**Innovation in Design**: Resource Reuse, Furniture & Furnishings > 60%	
1	Credit 1.3	**Innovation in Design**: Green Power, 100% for 2+ years	
1	Credit 1.4	**Innovation in Design**: Green Housekeeping	
1	Credit 2	**LEED® Accredited Professional**	

LEED Management Services www.leedmanagement.com

APPENDIX I:

Primary LEED Project Team Members

Elizabeth Kupfer
Office of the Attorney General
(Retired) Administrative Services Director
Santa Fe, NM

Michael Bodelson
NM Property Control Division of GSD
(Former) NM State Architect
Santa Fe, NM

John Baumgartel, PE & Pat Davis, EIT
Mechanical & Electrical Engineering, Inc.
MEP Engineer
Santa Fe, NM

W. Bradley Nelson & Dave Walker
Bridgers & Paxton Consulting Engineers, Inc.
Commissioning Authority
Phoenix, AZ/Albuquerque, NM
www.bpce.com

Selby Lucero
NM Building Services Division of GSA
Deputy Director
Santa Fe, NM

Pilar Cannizaro
Project Reviewer
Department of Cultural Affairs,
Historic Preservation Division
Santa Fe, NM

Valerie Walsh, LEED AP
LEED Management Services
LEED Consultant and Project Manager
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www.leedmanagement.com

Hugh MacRae
Cameron Construction, Inc.
General Contractor (Project Manager)
Santa Fe, NM
www.CameronBuildsIt.com

Fred Sorensen
Yearout Mechanical, Inc.
Albuquerque, NM

George Langdon & Dave Martin
Conron & Woods Architects
Project Architect, final phase
Santa Fe, NM
www.conronandwoods.com

Larry Miller and Jan Janecka
NM Property Control Division of GSD
Deputy Director, Special Projects/PM Team Leader
Santa Fe, NM

The New Mexico Villagra Building offers sweeping views of the Sangre de Cristo Mountains and is a distinguished member of the surrounding downtown Santa Fe community.

Chapter 3:

Green Resources & Tools

A Guide to Green Resources in New Mexico and Beyond

GREEN RESOURCES AND TOOLS

April 2007

Introduction

The following is a comprehensive list of national and regional green resources. Regional resources will be designated with a Zia symbol. This information has been organized into the 14 categories listed below.

- Green Organizations and Associations
- Green Design & Construction Professionals
- Green Building Materials
- Regional Construction & Demolition Waste Recycling, Materials Reuse and Recycling
- General Resources
- Financial, RFP, and Specification Resources
- State and Regional Incentive Programs and Tax Credits
- Green Power
- Regional Renewable Energy Companies
- Regional Publications
- Climate Change
- Education
- New Mexico Sustainable Cities
- Recognition & Awards Programs

Each resource listing is comprised of a website address along with a brief synopsis. Many of these listings contain extensive resources and links as well.

Green Organizations and Associations

U.S. Green Building Council

www.usgbc.org

The USGBC web site, combined with LEED-Online, are probably the two most valuable resource for participating in a LEED project. The web site contains information about the LEED® Rating Systems, including LEED reference materials, how to register a LEED project, Letter Templates for LEED documentation, Credit Interpretation Requests and Rulings, case studies, educational resources and an extensive Green Building links page (see table of contents below), in addition to the monthly newsletter. (See description of LEED-Online under "General Resources" in this chapter.) An online tutorial *How To Use LEED-Online and the USGBC Website* is found at www.leedmanagement.com.

Green Building Links – Table of Contents

Energy
Funding
Government Initiatives & Guidelines
Life-Cycle Analysis and Costing
Media
Rating Systems
Research Centers
Sustainability/Miscellaneous

Local U.S. Green Building Council (USGBC) Chapter

chapters.usgbc.org/newmexico

The USGBC New Mexico Chapter is a partnership of businesses, government agencies, and individuals that promote environmental, economic, and community sustainability in New Mexico. Website includes board member contact information, chapter events, and a link to join the Chapter, which includes a monthly newsletter, event emails and discounts on all events and training opportunities; national USGBC membership is not required. Chapter events include an annual Green Built Tour of green homes in New Mexico, monthly luncheon presentations, and Green Drinks networking.

American Institute of Architects (AIA) – Committee on the Environment (COTE)

www.aia.org/cote

The sustainable arm of the American Institute of Architects (AIA). At the time of publication, there was no local COTE chapter for New Mexico. This website has a wealth of information about COTE chapters nationwide, including news and events and highlights of the Top Ten Green Awards Program winners. (www.AIATopTen.org)

New Mexico Recycling Coalition

www.nmrecycle.org

A non profit organization made up of members representing private businesses, federal and state agencies, cities and counties, non profit organizations, trade associations, Native American tribes, educational institutions, and individuals. Website contains information about local recycling resources, recycling events, green building waste strategies and features a searchable directory for recycling specific materials. Information about construction waste management is available under “Tools: Green Building”.

New Mexico Solar Energy Association (NMSEA)

www.nmsea.org

A non profit organization promoting solar energy and related sustainable practices. Local chapters include Alamogordo, Albuquerque, Deming/Silver City/Las Cruces, Las Vegas, Los Alamos and Taos. Website presents information on annual Solar Fiesta, local events, workshops, a Solar Professionals Directory, and how to join the NMSEA.

Santa Fe Design Week

www.santafedesignweek.com

A no-cost, annual exposition featuring presentations, product and services exhibitions, and “events integrating environmental responsibility with designs for living.”

Green Design & Construction Professionals

U.S. Green Building Council (USGBC)

LEED AP (Accredited Professional) Directory

http://www.usgbc.org/DisplayPage.aspx?CategoryID=1306

A directory searchable by individual name, company, or location of LEED APs throughout the United States. If link provided here changes, go to "LEED" and on to "LEED AP Directory" from the USGBC home page.

(see full description of the USGBC under *Green Organizations and Associations*)

Sustainable Sources

directory.greenbuilder.com/search.gbpro

Sustainable Sources has a searchable database of green building professionals nationwide

(see full description of Sustainable Sources under *General Resources*)

EcoTone Publishing: Who's Green 2007 Directory

www.ecotonedesign.com/ecotone/bookstore

An annual directory designed to serve as the pre-eminent resource book for locating firms, companies, organizations and institutions that are actively participating in the growth of the green building industry. Includes contact information and profiles. Available for purchase from the website at a cost of $23.95.

Build Green NM – National Association of Home Builders (NAHB)

www.thegbi.org/newmexico

Provides links to locate a green residential builder or designer, information on products, residential green guidelines and a green organization resource list. Focus is primarily residential, but also contains valuable general local resource information.

New Mexico Solar Energy Association (NMSEA)

www.nmsea.org/Professionals_Directory_Listing.php

Directory of Solar Professionals also includes sustainable professionals

(see full description of NMSEA under *Green Organizations and Associations*)

Green Building Materials

BuildingGreen.com

www.buildinggreen.com

GreenSpec Directory is a comprehensive green building materials database, with thorough description of why each is green and includes manufacturer links to suppliers. Available in printed form for $89 or electronic version as part of the BuildingGreen Suite.

(see full description of BuildingGreen.com under *General Resources*)

Oikos – Green Building Source

www.oikos.com

Searchable database of green building products

(see full description of Oikos.com under *General Resources*)

Comeonhome.biz

www.comeonhome.biz

Link to local green manufacturers of building products

(see full description of Comeonhome.biz under *General Resources*)

Construction & Demolition Waste Recycling, Materials Reuse and Recycling

New Mexico Recycling Coalition (NMRC)

www.nmrecycle.org

Website contains information about local recycling resources, recycling events, green building waste strategies and features a searchable directory for recycling specific materials. Information about construction waste management is available under "Tools: Green Building".

(see full description of NMRC under *Green Organizations and Associations)*

GSA Construction and Demolition Waste Database

www.wbdg.org/tools/cwm-php

The U.S. General Services Administration's (GSA) published list of U.S. companies that recycle construction and demolition (C&D) waste. It is part of the Whole Building Design Guide and is searchable by region and material, as well as whether the company picks up waste or simply accepts it. The Construction and Waste Database is found under "Tools" and then "Professional & Construction Services".

Habitat for Humanity New Mexico: ReStore

www.habitatnewmexico.org

ReStores are retail outlets where Habitat for Humanity sells donated new and used home improvement products at prices below retail; proceeds help fund construction of Habitat for Humanity homes. The ReStore link provides contact information and donation criteria for stores throughout the state.

General Resources

(energy reduction tools, life-cycle assessment (LCA) tools, financial calculators, integrated design information, sustainable resources and case studies, etc.)

The Athena Sustainable Materials Institute

www.athenasmi.ca

The Athena Institute is a non profit research and database organization focusing on the life-cycle assessment of building materials. The Athena Model is life-cycle software for analyzing sustainable building materials.

Building for Environmental and Economic Sustainability (BEES)

www.bfrl.nist.gov/oae/software/bees.html

BEES software, a free download from the National Institute of Standards and Technology (NIST), assists in choosing cost-effective, environmentally-preferable building products, based on a life-cycle assessment approach.

Ecologic3

www.ecologic3.com/

A software package created to help building owners make informed decisions in choosing the most cost-effective LEED credits to pursue for their project based on cost inputs. Highlights the cost/benefit analysis of green building. Free demonstration is available on the website; a one-year program license may be purchased online for $349.

BuildingGreen.com

www.buildinggreen.com

Authorative information source without advertising by the editors of GreenSpec, Environmental Building News (EBN), and Green Building Advisor. Free online content for non-subscribers includes a sample newsletter, the latest GreenSpec products with reviews and manufacturer links, case studies, and their EBN bulletin. GreenSuite, their full subscription-based website, has access to over 150 case studies, over 2000 GreenSpec products with manufacturer and local links, Guideline Specification language, sustainable strategies and more. Full GreenSuite annual subscriptions cost $199; week-long sample subscriptions are $12.95. The GreenSpec printed directory is $89. Environmental Building News is $99 for a one-year subscription.

Green Building Discussion Group at BuildingGreen.com

www.buildinggreen.com/elists

The Green Building Discussion Group includes discussion on a host of green building issues, and includes separate discussion groups for large and small projects.

Comeonhome.biz

www.comeonhome.biz

Primarily focused on residential products and services available throughout New Mexico, but also provides valuable general information on water, sustainable services, design and building.

Department of Energy – Building Technology Program

www.eere.energy.gov/buildings

Quick links to energy solutions for different building types and to a comprehensive list of software tools (finance, design, construction, operation).

Department of Energy - High Performance Buildings

www.eere.energy.gov/buildings/highperformance

Software tools, case studies (building database), technology, research info.

Department of Energy - Building Software Tools:

www.eere.energy.gov/buildings/tools_directory

Provides energy efficiency, renewable energy and sustainability software tools ranging in scope from component and system analysis to whole building analysis.

Energy Design Resources

www.energydesignresources.com

Administered by a coalition of California utilities, the website has a comprehensive list of publications, software, training and other resources. Tools include life-cycle analysis, energy modeling, daylighting calculator, commissioning assistance.

Federal Energy Management Program, U.S. Department of Energy

www.eren.doe.gov/femp

Focuses on efforts to green federal buildings, but with good general information and tools. Includes financing, life-cycle analysis, case studies, and training seminars; includes the *Greening Federal Facilities Guide*.

General Services Administration – Buildings, Environmental Programs

www.gsa.gov/Portal/gsa/ep/channelView.do?pageTypeId=8195&channelPage=/ep/channel/gsaOverview.jsp&channelId=-13907

The GSA is the owner/provider of facilities for over 100 Federal government agencies and, as such, is among the largest real estate owners in the U.S. This site includes case studies, resources, GSA green-building programs, etc.

LEED-Online

http://leedonline.usgbc.org

LEED-Online is the web-based tool used for LEED project document administration and certification, and is essential to manage the project's application for certification and submittal documentation to the USGBC. LEED-Online is only accessible for registered projects by the LEED Project Administrator and invited team members.

International Initiative for Sustainable Built Environment

www.greenbuilding.ca

Canadian-based international organization. Sustainable Building Information Systems has searchable database of articles and life-cycle analysis tools and policies section.

National Institute of Building Sciences: Whole Building Design Guide

www.wbdg.org

Thorough coverage of commercial green buildings, design guidance (including a wide variety of building types and disciplines), project management information, and in-depth resources and tools sections.

NREL High Performance Buildings Research

www.nrel.gov/buildings

Somewhat integrated with DOE High Performance Buildings website and similarly focused on energy efficiency. Information on buildings research, software tools, case studies, etc.

Oikos – Green Building Source

www.oikos.com

Green building news, a searchable database of green building products, project case studies and a bookstore. For a list of local companies, click on the "power search" link under "products" and type in your state abbreviation.

Sustainable Sources

www.greenbuilder.com

This website contains a link to a searchable database of green building professionals nationwide. This site also contains a link to national and international green events, rating systems and green building programs.

U.S. Environmental Protection Agency

www.epa.gov

Broad range of environmental information on statutes and regulations, indoor air quality, programs and initiatives, and environmental databases.

U.S. EPA Energy Star Program

www.energystar.gov

Target finder assists in setting and evaluating energy saving goals. Financial calculation tools, energy efficiency programs, considerable residential resources.

U.S. EPA Environmentally Preferable Purchasing Program

www.epa.gov/opptintr/epp/

The EPP program is designed to assist government agencies in purchasing products that have less of an impact on the environment and employee health. Includes purchasing guides, case studies, and training and evaluation tools.

Financial, RFP, and Specification Resources

Capital E Study: Green Building Costs and Financial Benefits (Nov 2003)

www.cap-e.com/spotlight/index.cfm?Page=1&NewsID=25770

The Costs and Financial Benefits of Green Building: California Case Study

www.ciwmb.ca.gov/greenbuilding/Design/CostIssues.htm#Cost&Benefit

Sample Green RFP Language

www.aia.org/cote_rfps

www.seattle.gov/dclu/GreenBuilding/CapitalProjects/DesignToolsStrategies/DPDS_007481.asp

Building Systems Design, Inc. SpecLink/PerSpective/CostLink

www.bsdsoftlink.com/speclink/sl_frame.htm

Includes over 700 master specification sections, performance oriented project descriptions, and cost

estimating tools for designers. LEED requirements are incorporated into PerSpective and SpecLink products.

ARCOM Masterspec/Specware
www.arcomnet.com

Masterspec libraries include full length, 530 short-form, and 500 outline sections. Product offering includes "Small Project" with abridged sections, and "Specifying LEED Requirements" with LEED specific language.

BuildingGreen.com
www.buildinggreen.com

The GreenSpec Directory includes Guideline Specifications by CSI Division with four sections in Division 1 organized in the new MasterFormat 2004 structure.

State and Regional Incentive Programs and Tax Credits

Albuquerque Bernalillo County Water Utility Authority
www.abcwua.org

Offers several incentive programs to encourage water conservation, including rebate programs for low-flow fixtures, landscaping, rain water barrels, hot water recirculation units and sprinkler timers. Rebate information is located under the Water Conservation link; site also provides information on local water resources and water quality.

New Mexico Energy, Minerals and Natural Resources Department: Solar Market Development Tax Credit
www.emnrd.state.nm.us

Information and forms for the NM Solar Tax Credit are available under the "Renewables and Energy Efficiency" link. Current tax incentive is 30% of system installation costs for qualified solar thermal and photovoltaic (PV) systems installed after January 1, 2006, up to $9,000 maximum; homeowners, business owners and agricultural enterprises are eligible. Please visit the website for the most current information.

New Mexico Energy, Minerals and Natural Resources Department: Sustainable Building Tax Credit
www.emnrd.state.nm.us

Senate Bill 463 passed in March 2007 and offers a tax credit based on LEED® Certification level achieved for commercial buildings or LEED, EPA EnergyStar®, or Build Green NM certification level for residential buildings. Applies to new construction or major renovation in tax years 2007 to 2013. Maximum annual tax credit fund is $10 million, awarded on a first come-first served basis.

PNM Solar PV Program
www.pnm.com/customers/pv/program.htm

The PNM solar photovoltaic program for home or business pays the customer for the renewable attributes of the solar electricity generated by your photovoltaic system; provides technical program requirements.

New Mexico Coalition for Clean Affordable Energy (CFCAE)
http://www.cfcae.org/

The CFCAE promotes the development of renewable energy sources in New Mexico. Website includes a wealth of information about renewable energy in New Mexico, including programs, policies, legislation and incentives; technologies & resources; current events & links to other local clean energy and environmental advocacy groups.

Green Power

(where to find green utility providers or purchase renewable energy certificates (RECs) also known as green tags. This is for clean renewable power generated off-site.)

Green-e

www.green-e.org/your_e_choices/new_mexico.html

Green-e is the nation's leading independent third party certification and verification program for renewable energy and companies that use renewable energy. Website has links to purchase renewable energy for either home or business and a database of renewable energy resources searchable by location and renewable energy resource.

Department of Energy

www.eere.energy.gov/greenpower/buying/buying_power.shtml?state=NM

The "Green Power Markets" section lists wholesale and retail renewable energy certificate (REC) marketers and brokers; the "Buying Green Power" section provides information about green power retailers by state.

(see other DOE resources under *General Resources)*

U.S. Environmental Protection Agency

www.epa.gov/greenpower/buygreenpower/procure.htm

The Green Power Partnership section has useful links about the green power procurement process, including a Green Power Locater to find green power resources by state.

(see other EPA resources under *General Resources)*

PNM Sky Blue™ Program

www.pnm.com/customers/sky_blue.htm

Information about purchasing wind energy from the local utility Public Service Company of New Mexico (PNM); several purchase options are available.

Eco Business Links Environmental Directory

www.ecobusinesslinks.com/green_electricity_providers_sustainable_power_companies.htm

Provides a list of Green utility providers throughout the country.

Regional Renewable Energy & Fuel Companies

(for purchase and installation of on-site renewable energy systems for your building)

Renewable Energy Businesses in the United States by State

energy.sourceguides.com/businesses/byGeo/US/byS/byS.shtml

Lists renewable energy businesses throughout the country, searchable by state or by product type.

Renewable Energy Access

www.renewableenergyaccess.com/rea/partner/search

A searchable database of companies by technology and location.

Renewable Energy Partners of New Mexico

www.renewableenergypartners.org
Production and retail sales of NM biofuels for transportation purposes. Public education on flex-fuel vehicles and biofuels. Cyberlot for alternative fuel vehicles.

Regional Publications

Sustainable Santa Fe Resource Guide

http://www.earthcare.org/cms/index.php?option=com_content&task=category&sectionid=4&id=34&Itemid=32

Essays, articles, and interpretations of sustainability from some of the leaders in Santa Fe's green movement, including business, education, agriculture, community, and building industry sectors. "Resource Guide Listings" section provides contact information for local sustainable businesses and organizations.

Living Green Magazine

www.living-green.org

Free magazine published six times a year in Albuquerque, Santa Fe, and Boulder County, CO.

Local U.S. Green Building Council (USGBC) Chapter Newsletter

chapters.usgbc.org/newmexico

Monthly electronic newsletter is distributed to local chapter members only; contains articles and information on upcoming events, board member contact information, and committee updates.

(see full description of USGBC under *Green Organizations and Associations)*

New Mexico Recycling Coalition (NMRC)

www.nmrecycle.org

Electronic newsletter is distributed to coalition members only; contains information about upcoming events, educational opportunities and helpful recycling tips.

(see full description of NMRC under *Green Organizations and Associations)*

Climate Change

New Mexico Climate Change Advisory Group

http://www.nmclimatechange.us/

Information about the impact of climate change in New Mexico and the background of New Mexico's climate change movement, including a link to the Climate Change Action Plan published in December 2006.

Architecture 2030

www.architecture2030.org

Renowned Santa Fe-based solar architect and author Ed Mazria is the creator of Architecture 2030, a research and advocacy group that provides solutions in the fields of architecture, education, and planning in an effort to address immediate global climate change. The organization's 2030 °Challenge calls for the global architecture and building communities to adopt guidelines for reduced greenhouse gas emissions and fossil fuel use, ultimately reaching zero fossil fuel use in new buildings by the year 2030. Website features information on climate change and building sector contributions to national CO_2 emissions; case studies; frequently-updated news on environmental topics including legislation, events, and business news.

Education

U.S. Green Building Council (USGBC)

Higher Education Resources

www.usgbc.org

Links include green certificates and educational programs, as well as campus facilities green practices and case studies. Also includes a list of professional organizations with green education programs.

EcoVersity

www.ecoversity.org

Located in Santa Fe, EcoVersity's campus serves as a demonstration site and a community building center for the promotion of "hands-on" learning and sustainable living.

Local U.S. Green Building Council (USGBC) New Mexico Chapter

chapters.usgbc.org/newmexico

Offers technical LEED workshop opportunities along with free presentations about the LEED Rating System. National website includes information on the LEED Professional Accreditation Exam.

(see full description of USGBC under *Green Organizations and Associations)*

LEED NC v2.2 Study Guide

chapters.usgbc.org/colorado/leed.html

Excellent study guide produced by the Colorado Chapter of the USGBC to assist in preparing for the LEED Professional Accreditation Exam, updated for LEED-NC version 2.2; also includes a practice exam. Available for purchase on the USGBC Colorado Chapter website for $50.

New Mexico Solar Energy Association (NMSEA)

www.nmsea.org

Local chapters offer workshop and conference educational opportunities. Please visit the website for the most current event information.

(see full description of NMSEA under *Green Organizations and Associations)*

New Mexico Recycling Coalition (NMRC)

www.nmrecycle.org

The NM Recycling Coalition offers certification classes along with an annual conference. Please visit the website for the most current event information.

(see full description of NMRC under *Green Organizations and Associations)*

Boston Architectural College

www.the-bac.edu/green

Boston Architectural College offers an online Sustainable Design Certificate program for individuals that are seeking LEED accreditation or LEED accredited individuals who are seeking more technical knowledge. Site contains course descriptions and registration information.

New Mexico Sustainable Cities

Sustainable Albuquerque

www.cabq.gov/sustainability/

Includes the Mayor's message about sustainability; past and future efforts to increase the city's sustainability, including awards and initiatives; information about regulations governing recycling, air quality, and green spaces in Albuquerque; and information and resources for citizens on sustainable homes, workplaces, transportation, shopping, and recreation.

Recognition & Awards Programs

Green Zia Environmental Excellence Recognition Program

www.nmenv.state.nm.us/Green_Zia_website/

The New Mexico Environment Department's public recognition and assistance program that acknowledges and supports businesses or organizations which desire to move towards environmental excellence and long-term environmental and economic sustainability. Involves a self-assessment, feedback from the examining board, and public recognition for achievements. Fee based on number of employees.

Chapter 4:

Top-Ten Tips for First-Time LEED Teams

TOP-TEN TIPS FOR FIRST-TIME LEED TEAMS™

Presented at the AIA New Mexico State Convention October 2005
Originally published by McGraw-Hill
Updated April 9, 2007

By Valerie Walsh, LEED Accredited Professional

As the number of New Mexico USGBC LEED® projects begins to increase, this is a good time to review the experiences of first-time LEED teams who've learned some valuable lessons. While your team may come together out of its desire to create a green or sustainable project – how well you manage the process and documentation will largely determine whether it earns LEED certification. A successful team will understand from the start that LEED projects require a whole-systems design approach, and will depend throughout on collaborative, interactive, and multidisciplinary teamwork. Here are ten tips that will guide your first-time team.

1) Plan Early.

A common mistake for first-time teams is trying to work LEED goals into a project that is too far along in the design process. Make the decision to pursue LEED certification as early as possible, ideally in pre-design. Design strategies should be developed collaboratively from the start. The best results are achieved when the design is a result of the team's sustainable objectives and goals, rather than trying to shoehorn LEED features into a set design, or "chase" points to make them fit. The owner's sustainable priorities will be your guide.

2) Delegate or Hire a LEED Manager.

Skanska USA LEED construction manager Steve Gourley on the Duke University LEED project offers this advice: "*You (owners) need a LEED Champion to facilitate the LEED part of the contract, keep the ball rolling, organize meetings, track deliverables, and be the prime point of contact for the owner…*". The LEED Manager knows where you need to go and how to get you there. While all teams benefit with a LEED Manager driving the boat, it is essential for first-time LEED teams. The most important thing is to have one qualified person responsible for coordinating, tracking, and reviewing the LEED requirements and submittals for the whole team all the along the way.

3) Start with an Eco-Charrette.

"Hold charrettes early and often and be certain that the gamut of stakeholders are active participants" advises Professor Brian Dunbar, USGBC LEED Faculty and director of the Institute for the Built Environment at CSU. Prior to any drawings, gather the entire team of design and construction professionals as well as the owner, occupants, maintenance personnel and perhaps even local officials, community members, utility company rep, or product manufacturers for a pre-design charrette. The length and frequency of charrettes will vary based on the size and scope of the project. Ideally they will occur in each design phase. Also consider a team tour of an exemplary facility to inspire integrated thinking and to see what works in your area.

4) Get some (or more) LEED training.

Attend a LEED workshop (cost about $375 including materials) or arrange for a private seminar for your office or team members new to LEED. Become a LEED Accredited Professional (exam fee $250 for USGBC members). Both found at www.usgbc.org. The updated v2.2 LEED Professional Accreditation Study Guide ($50) is available through the USGBC Colorado Chapter to assist in becoming an effective LEED AP and includes a practice test and new EB and CI sections. The LEED-NC Technical Review workshop, amongst many others, periodically comes to New Mexico through the local Chapter. The USGBC has a new LEED study course online as well. Buy and study the USGBC LEED-NC Reference Guide currently in Version 2.2 ($150 member price). Attend the annual USGBC Greenbuild conference for a powerhouse experience of sustainability and LEED. The New Mexico Chapter has monthly local presentations worth attending. While charrettes often include an introduction to LEED for first-time teams, I recommend prepping before then to be ready to hit the ground running.

5) Include LEED Requirements and Specs in RFPs, bid packages, and Construction Documents.

LEED Requirements directly impact numerous Specification sections, in addition to the Division 1 section dedicated to LEED Requirements. It is most important to include what submittals will be required of each team member and their vendors in the specs and bid package. Additionally, contractors are probably not accustomed to submitting Management Plans for Construction Waste or Indoor Air Quality (IAQ) as a requirement.

Purchase or develop contract specifications for LEED Requirements, including sample management plans and templates for the contractor. MasterSpec for LEED Requirements is one such product. The update for LEED-NC v2.2 is expected to be released by summer 200 and is expected to include LEED-CI, LEED-EB, and LEED-CS. Research building materials and products early, as they typically impact numerous credit point outcomes, and request product submittals from the contractor for approval well in advance too. Monthly progress reports from the General Contractor are important to write into the specs to gauge whether they are on track for achieving project goals. Supply the project specific LEED Letter Templates for Contractor's in bid packages so they get a look at what type of submittals and backup data will be required of them.

6) Hire experienced LEED consultants.

LEED has spawned a new field of specialists that will help you achieve sustainable and LEED goals. Be prepared for some new team members. LEED specialists can include daylighting/electrical engineers, energy modelers & analysts, sustainable technology designers, commissioning authorities, sustainable design charrette leaders, and the LEED Manager or Consultant.

7) Document as you go.

Gather the submittals necessary for certification all along the way. If you wait until the end of the project you will be chasing down recycled content cut sheets, MSDS forms for VOC content, GreenGuard certificates, or FSC wood chain-of-custody certificate numbers from vendors who have new work on their radar and will therefore be harder to obtain.

Be familiar early with the LEED Letter Templates and requirements that you are responsible for submitting and the documentation that may accompany them so you know what to compile or calculate. If you are the LEED Manager, create a simple checklist to track receipt, review and completion of each credit point submittal. Study the "Submittal Documentation" section of each credit point and prerequisite

in the Reference Guide in addition to the LEED Letter Templates. The Reference Guide is available online to the Project Administrator of a registered LEED project. As of June 2006, a non-interactive PDF version of the Letter Templates is now available on the USGBC website for anyone to see. Only registered projects have access to the interactive Letter Templates which include calculators.

If your project is v2.1 and registered prior to December 31, 2005, be familiar with the Audited Credit Requirements that you will be expected to provide in the review process following your certification submittal. It can be found online with some digging at www.usgbc.org under LEED Certification Process.

LEED-Online is the new streamlined LEED certification web tool that the USGBC released in mid-2006 for NC v2.2, CI, and EB. LEED-Online for CS is currently in Beta testing. It is a big improvement from the old system for certification submittals that used cumbersome Excel Letter Templates and all backup documentation were bulky paper-intensive submittals in 3-ring binders. The new worksite allows team members to upload the required Letter Templates and required submittal documents on this central project website. Another feature is that of the two-phase certification submittals. The design submittals may be submitted separately from construction submittals for USGBC review.

8) Build-in extra points for LEED certification.

Plan on USGBC denying 3-4 points that you submit, at least for the fully-audited program preceding LEED-Online. Study the Credit Interpretation Requests & Rulings (CIRs) on the USGBC site to get a good idea about which approaches and design strategies fly and which get shot down. The Innovation points can be more unpredictable than others. Also shoot for another 3 or 4 points that you'd like to achieve but for various reasons, may not materialize prior to submittal. Consider targeting one full certification level higher than you would be satisfied with. If you should find yourself short at the end, purchasing renewable energy "green tags" for the extra Green Power credit has turned into an "insurance" point for some teams. Go to www.green-e.org for more information on purchasing green power.

9) Bring-in the Commissioning Authority early.

Teams new to LEED may overlook the need to bring the Commissioning Authority (CxA) in during the early design phase to document the owner's energy-related project requirements. The CxA needs to review both the Owner's Project Requirements (OPR) as well as the Basis of Design (BoD) at specific stages. The Commissioning requirements need to be in the construction documents. The CxA role continues through the design and construction phases and in the case of the Enhanced Commissioning point, through the first year of post-occupancy.

Make certain that you understand who is qualified to serve as the Commissioning Authority. The v2.2 Reference Guide has a very thorough explanation on this and the requirements of both the Fundamental Commissioning (EAp1) and Enhanced Commissioning (EAc2) credit. As an example, the Enhanced Commissioning credit requires the CxA to be from an independent firm who is not involved in the project design or management and cannot be hired by the firms holding construction contracts. The Fundamental CxA in some cases may be from the same firm of a project team member, but this Prerequisite needs to be reviewed carefully for compliance. Visit the www.usgbc.org website under LEED-NC for a chart entitled "Who can serve as the Commissioning Authority?"

Fundamental Commissioning of the Building Energy Systems is a Prerequisite of LEED and one that you can't backtrack on if you haven't incorporated it from the start.

10) Stay current.

Become familiar with the USGBC website, www.usgbc.org. It is where you register your LEED project. It is a wealth of information on everything LEED, including the reference guides, LEED rating systems and application guides now active, in pilot, or under development; registered and certified projects; events, sustainable industry resources, news, reports, research, case studies, member's directory, LEED AP listings, and more. Members, subscribers and/or registered projects have more access to these online resources. LEED Letter Templates, Reference Guides, Errata and Credit Interpretation Rulings (CIRs) are found here, but Letter Templates and CIRs can now be accessed on the LEED-Online workspace for managing your LEED project more centrally.

Sign up for the electronic USGBC Newsletter. Check out the published studies to help you present LEED to clients with confidence such as Examining the Cost of Green, Making the Business Case for LEED, and others under Member Resources. GreenerBuildings.com is a free online newsletter the USGBC has become associated with recently.

Get on a Corresponding Committee with USGBC to stay current with your particular area of interest. There are 25 such committees ranging from schools, state & local government, laboratories, lodging, and healthcare facilities to name a few. It is a selective way to focus your LEED interests. The USGBC online chat sessions are a good way to learn more about a new LEED program and get questions answered for your project in real time. The new Member Circles are underway for direct contact with other members.

Become a member of the New Mexico Chapter of the USGBC to connect with active professionals and receive communications of valuable local talks, seminars, events, tours and more. Monthly chapter presentations are a good way to learn and network green. Join online through the USGBC site under the "Chapters" link. Don't forget about the Green Drinks get-together every month too!

Also check out www.BuildingGreen.com, the authoritative information source on environmental building and authors of GreenSpec, Environmental Building News (EBN), Green Building Advisor and over 100 Case Studies. Try out their list of free content for non-subscribers that includes a sample newsletter, the latest GreenSpec products with reviews and manufacturer links, case studies, and their EBN bulletin.

Their online BuildingGreen Suite by subscription is an invaluable design resource for sustainable and LEED projects that I have come to rely on. One of the Suite products is the online GreenSpec directory, searchable by LEED credit, CSI designation, green attribute, homebuilder category, or by U.S. EPA CPG Recycled Content Products listing. It also includes Guideline Specification language. The EBN newsletter is cutting-edge unbiased journalism with no advertising. BuildingGreen is listed as a resource under countless credit points in the USGBC Reference Guides.

Subscribe to GreenSource Magazine www.greensourcemag.com launched in June 2006 brought to you by a great team of McGraw-Hill and BuildingGreen, Inc. Environmental Design & Construction Magazine www.EDCmag.com now covers residential along with commercial high-performance building and are LEED oriented. Attend a green building conference. The US Green Building Council's annual Greenbuild Conference & Expo will be in Chicago November 7-9, 2007. Attendance was over 13,000 at Greenbuild 2006 in Denver. Don't miss it!

Challenge your team! You'll be surprised at the sustainable solutions you'll discover together and the spirit that is created once you've established your vision and intention for the project.

Valerie Walsh is an independent LEED manager and specialist in Colorado and New Mexico. Walsh manages and coordinates the LEED process with teams on projects ranging from commercial and government to historic renovation and retail/campus applications. Walsh is a LEED Accredited Professional and has written the "Road Map to LEED® Certification".

Walsh was Director of Publication for the first GreenSpec national directory in 1996, and currently serves on the Education Committee for the Colorado Chapter of the US Green Building Council. She is also a graduate of the CSU Green Building Certificate Program; the Succeed at LEED advanced program, and The Natural Step.

In June 2007, Walsh completed the "How-To Guide to LEED Certification for State of New Mexico Buildings", an educational Clean Energy Grant in collaboration with the NM Attorney General and the NM Chapter of the USGBC.

Prior to founding LEED Management Services she was a pioneering green builder in Santa Fe and owned Green Horizon for 18 years. Her national speaking engagements and published work on green and solar building began in 1980.

Her "Top-Ten Tips for First-Time LEED Teams" first appeared in McGraw-Hill's Colorado Construction Journal Green Building Special Edition. She is also the LEED columnist for Architect magazine.

LEED Projects serving as the primary LEED Consultant and Project Administrator:

The Villagra Building for the New Mexico Attorney General, NM State Capitol Complex, Santa Fe; LEED-CI Gold Certified (first Gold in New Mexico; third LEED certified building in New Mexico)

Wild Oats Markets, Boulder, CO; registered LEED-NC v2.2 Retail Pilot

Santa Fe Farmers' Market Institute, Santa Fe, NM; registered LEED-CS v2.0

City/County of Denver, Willis Case Golf Clubhouse; registered LEED-NCv2.2

The Kinship Institute, Santa Fe County

LEED Management Services Professional Memberships:

US Green Building Council

US Green Building Council - New Mexico Chapter

US Green Building Council - Colorado Chapter

Boulder Green Building Guild

CORE, Connected Organizations for a Responsible Economy

Rocky Mountain Climate Organization

FINCA

LEED Management Services is a carbon-neutral business, powered by wind!

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How to Use LEED-Online and the USGBC Website

An Online Tutorial shows you how to use LEED-Online, the USGBC web tool, for LEED project documentation, as well as how to navigate the USGBC website for resources central to a LEED project.

This is available at www.leedmanagement.com.

CONCLUSION

The green building industry is gaining momentum as valuable tools, like the LEED Rating System, are available to help guide project teams to more sustainable and energy efficient buildings. As natural resources become more scarce, fuel prices rise and become more volatile, and communities understand the impact their local surroundings have on their health and well-being, more attention and value will be placed on this growing movement towards sustainable building communities.

Currently, LEED serves as an efficient guideline and resourceful program to help facilitate a new generation of better performing buildings. The tools presented in this Guide are intended to help support a project team's approach to developing and documenting a project's sustainable strategies, in compliance with LEED. These resources should help make using the LEED Rating System efficient, by reducing the learning curve associated with first-time LEED use.

In addition to this Guide and related resources provided by the New Mexico Energy, Minerals and Natural Resources Department (http://www.cleanenergynm.org), visit the USGBC website, and the local New Mexico Chapter (http://chapters.usgbc.org/newmexico), for more information on how to apply sustainability to your next New Mexico project. May your journey be rewarding and successful.

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"We can and must build a whole new economy based on clean renewable energy."

-New Mexico Governor Bill Richardson, executor of the Climate Change Action Plan