An Analysis of the U.S. Real Estate Value Chain with Environmental Metrics

Report Prepared for Environmental Defense Fund

Appendices

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Appendices

Appendix A. Summary of Key Areas of Interest

Industry Segment/ Company	Real Estate Category	Why of Interest	Trade-offs
REITs		REITs own and operate large amounts of real estate and tend to do their own property management.	Some REITs also turn over their properties often, or a large buyer can buy out all the properties in a REIT and flip them (what Blackstone did in 2007 with the largest office REIT).
Boston Property (Boston)	Office	Largest office REIT	
Simon Property Group (Indianapolis)	Retail	Largest regional shopping mall REIT; received LEED award in 2004 and 2005	
Prologis (Denver)	Industrial	Largest industrial REIT; website says it is world's largest owner, manager, and developer of distribution sites; headquarters is LEED-certified; company has constructed 60 million square feet of space for Build-to-Suit clients, including Coca Cola, Honda, GM, NYK (shipping services)	

Equity Residential (Chicago)	Residential (multi-family)	Largest multi-family REIT; largest publicly traded owner, operator and developer of U.S. multifamily housing	
Large Institutional Investors	Commercial	Companies in the Owner/Developer segment rely heavily on Investors to provide equity for their next acquisition or development deal. Investors could decide, for example, to ensure that X percent of their real estate portfolio was in LEED-certified buildings.[1] Developers would be sensitive to this incentive. CalPERS (California Public Employees' Retirement System), the largest U.S. pension fund, recently set a goal of reducing energy use in its real estate holdings by 20 percent over the next five years.[2]	The concept of socially responsible investment is only recently catching on among real estate investors.

[1] LEED is now doing a pilot portfolio program to work with investors and others with large amounts of real estate, experimenting with a "volume certification" concept. Owners could do LEED certification across the board as a standard feature of their design, construction, and operations. The pilot program is due to be completed in mid- 2008: http://www.usgbc.org/ShowFile.aspx?DocumentID=3387

[2] Vivian Marino, "A Starring Role for Green Construction," New York Times, April 29, 2007.

Secondary Market	All categories	There are opportunities for the secondary market to cooperate with lenders to offer more attractive rates on mortgages that meet certain green building or energy efficiency criteria.	To date most green mortgages have consisted of discounted closing costs. Arrangements that actually allow borrowers to borrow more money, in contrast, are more attractive to owner/developers, and they do apply them to commercial multi-family projects. Still, there are probably more direct ways to influence owner/developers.
Fannie Mae and Freddie Mac (Washington, D.C. and McLean, VA)	Residential	These government sponsored enterprises (GSEs) provide a secondary market for home mortgages. Apart from Homebuilders, they are the only significant leverage point for partnering with individual homebuyers.	Fannie Mae has offered green mortgages for 15 years, but few borrowers take advantage of them.
Property Management The largest property management companies are full-service real estate firms		Property Managers can help clients make energy choices in existing buildings.	The question is to what extent a third-party firm can influence the property owner's decision-making concerning energy use.

Full-Service Firms		Full-service firms handle real estate needs for large corporations that own, operate and occupy large amounts of real estate.	An additional question is how much of a full-service firm's real estate footprint is in high-impact boxes such as property management, versus in weaker boxes such as real estate brokerage.
CB Richard Ellis (Los Angeles)	All Commercial categories	CBRE is the largest full-service real estate services firm in the world. It committed in 2007 to becoming carbon neutral, in its own operations, by 2010.	Revenue breakdown: Sales & leasing (weakest box): 68 % Property management: 14 % Investment management: 6 %
Jones Lang LaSalle (Chicago)		Estimated to be CBRE's top competitor in sales and leasing for corporate clients	
Cushman Wakefield (New York)		CBRE's top competitor in property management	

Appendix B. Full profile of Fannie Mae

Company: Fannie Mae
Headquarters: New York, NY

Ticker Symbol: FNM
Year Established: 1905

Role in Vale Chain		**Year / Source**
Segment of value chain	Finance (Debt, Equity)	
Box in value chain	Investment Banks	
Type of real estate	Single-Family Credit Guaranty, Housing and Community Development and Capital Markets	
Main activities	Provides funds to mortgage lenders through its purchases of mortgage assets, and issuing and guaranteeing mortgage related securities that facilitate the flow of additional funds into the mortgage market. One of the largest issuer of mortgage-related securities. Also one of the largest participants in the multifamily secondary market.	Datamonitor
Primary NAICS code	522292 Real Estate Credit	
SIC code	6111 Federal & Fed. Sponsored Credit	

Size		
Annual revenues	$45,352,000,000	
Assets	$843,936,000,000	
Sales		
Market capitalization	$28,093,000,000	
Employees (worldwide)	6,400	
Note	Company does not release figures on loan volume	
Environmental Initiatives	Offers an Energy Efficient Mortgage program which helps people finance cost-effective, energy-saving measures as part of their mortgage. The goal is to help people reduce monthly utility bills while helping the environment. Fannie Mae also adjusts the value of the home to reflect the value of the energy-saving measures. Built the first LEED certified data center, will probably continue in this trend for construction of corporate buildings.	
Geographic scope	Active in US housing industry	
History and mergers	1938 created as a government agency 1968 rechartered by Congress as a shareholder-owned company, funded solely with private capital	Datamonitor

	1990 became the largest issuer and guarantor of MBS 1992, Fannie Mae's capital requirements were raised and the company was given a mandate to lend greater support to inner-city buyers. 1997 name Fannie Mae officially adopted 2000 began offering securities for sale over the internet 1998-2004 accounting fraud, subsequent investigation and fine 2007 Fannie Mae with RCG Longview, a New York City based real estate opportunity manager, launched Community Investments Mezzanine-Moderate Rehabilitation (CI Mezz-Mod Rehab) product. It provided a one-stop financing solution for multifamily properties with moderate to substantial rehabilitation needs by combining a permanent DUS loan with a mezzanine loan.	
Main competitors	Bank of America Citigroup Inc. Freddie Mac JP Morgan Chase & Co	Datamonitor
Date of last update		**3/4/2008**

Appendix C. Summary Tables of REITs, Secondary Market, Property Management

Real Estate Investment Trusts (REITs)

Company	Scale, in Dollar Measures	Scale, in Square Feet of Space	Primary Impact on Existing or New Buildings	Environmental Initiatives	Market Timing
Simon Property Group (Retail) Indianapolis SPG	Annual revenues: $3.3 billion Assets: $22 billion Shareholder equity: $3.9 billion Market capitalization: $19.7 billion	**Buildings Census figure: 244 million sq ft**[3] U.S. gross leasable area: 201 million sq ft Total gross leasable area: 215 million sq ft Number of U.S.	To date, mostly existing Owns large parcels for future construction Primary operations are malls, shopping centers, community/ lifestyle centers, premium outlet centers	Focus on reducing electricity use; won top NAREIT award for reducing electricity usage 10% (second consecutive year) Experimenting with pervious concrete Gaining reputation for	Although analysts expect the mortgage crisis to trickle down to the retail sector, regional malls (Simon's focus) are expected to be the strongest category to withstand the downturn[5]

[3] The Buildings Census figure represents the total square footage for each company; it is the most consistent source we have found for comparing square footage across firms. Buildings.com, "2007 Buildings Census: Building Ownership and Development," September 2007. http://www.buildings.com/articles/detail.aspx?contentID=5098 accessed 01/28/08.

		Properties: 286 Total properties: 345 Properties wholly owned: 199		"green" construction projects[4]	
Company	**Scale, in Dollar Measures**	**Scale, in Square Feet of Space**	**Primary Impact on Existing or New Buildings**	**Environmental Initiatives**	**Market Timing**
Prologis (Industrial/distribution) Denver PLD Largest U.S. industrial REIT	Annual revenues: $2.4 billion Assets: $15.9 billion Shareholder equity: $6.4 billion	**Buildings Census figure:** **437 million sq ft** Total gross leasable area: 391 million sq ft GLA owned: 235 million sq ft	Primarily new construction; significant interest in facility development Primary operations are industrial and distribution facilities. Small retail presence	New initiative: all current and future projects to be submitted for LEED approval Company's headquarters in Denver is LEED certified Sole real estate company	Industrial category is not expected to be severely affected by market instabilities from the mortgage crisis

[5] Ibid.

[4] John Spence, "UBS says retail REITs can weather spending pullback; Simon is top pick," MarketWatch, November 26, 2007, http://www.marketwatch.com/news/story/ratings-game-malls-seen-defensive/story.aspx?guid=%7BF31A9A42%2D2FCC%2D4072%2DBC10%2D722227BDD9B4%7D&dist=hplatest&dist=dist_smartbrief&dist=dist_smartbrief, accessed 1/17/08.

Company website says it is world's largest owner, manager, and developer of distribution sites	Market capitalization: $30.1 billion	Total properties: 2,348 Properties wholly owned: 1,587 Weighted average ownership interest: 25%	Company has constructed 60 million square feet of space for Build-to-Suit clients, including Coca Cola, Honda, NYK (shipping services), Ricoh, and General Motors.	to be a member of the Chicago Climate Exchange, the first U.S. voluntary pilot program for trading of greenhouse gases Named UK's overall green business of the year by World Business magazine	

Company	Scale, in Dollar Measures	Scale, in Square Feet of Space	Primary Impact on Existing or New Buildings	Environmental Initiatives	Market Timing
Boston Property (Office) Boston BXP	Annual revenues: $1.5 billion Assets: $9.7 billion Shareholder equity: $3.2 billion Market capitalization: $20.1 billion	Total gross leasable area: 391 million sq ft Total properties: 131 Properties wholly owned: 125 All operations located in the US	Both new construction and acquisitions All operations located in New York, Washington DC, Boston, San Francisco, and Princeton, NJ	Participant in LEED program; extent of compliance unknown. Some buildings are Energy Star rated.	Office operations are not likely to be severely affected by current real estate conditions, especially in these major markets. Asset values may decline.

Equity Residential (Residential) Chicago EQR	Annual revenues: $2 billion Assets: $15 billion Shareholder equity: $5.9 billion Market capitalization: $22 billion	**Buildings Census figure:** **128 million sq ft** Total leasable apartment units: 165,716 Total properties: 617 Properties wholly owned: 546	All operations are residential and condo. Both development and acquisition activities. Sites are in strategic markets within the US.	No apparent initiatives	Residential is likely to be the hardest hit sector of real estate
Vornado Realty (Office, retail) New York VNO	Annual revenues: $2.7 billion Assets: $18 billion Shareholder equity: $6.2 billion	Total gross leasable area: 60.2 m sq ft Total properties: 283 Ownership stakes: AmeriCold Storage 48% Toys ‘R Us 33% Alexander’s Inc. 33%	Office, retail, merchandise marts operations. Primarily acquisitions	No apparent initiatives	Relatively stable sector, but Toys ‘R US is dependent on seasonal fluctuations and economic conditions to a greater extent than other operations

Sources: Mergent Online, company websites, annual reports.

Appendix D (cont'd)

Secondary Market

Company	Scale, Various Measures	Type of Leverage	Environmental Initiatives	Market Timing
Goldman Sachs Global investment banking, securities and investment management Headquarters: New York	Number of employees: 30,522 Total revenue: $69,353,000,000 Net revenue breakdown: Investment banking 15% Trading & principal investments 64%	The company buys commercial mortgages and sells them as securities to institutional investors. They could conceivably create "green-building financing" instruments that would motivate developers to adopt certain best practices or seek LEED certification. Through its Urban Investment Group, the company invests in urban real estate and other ventures.	In 2005 the company committed to investing $1 billion in renewable energy and energy efficiency. By the end of 2007, the company had invested over $2 billion in alternative energy projects in the US, Europe and Asia.[6] Has funded $2.3 million of research into market-based solutions to climate change.[7] Currently working toward LEED Gold certification for world headquarters (2.1 million ft^2) in New York, to be completed in 2009.	Goldman Sachs may be the only investment bank that made landmark profits during the 2007 sub-prime mortgage crisis. The bank had largely avoided buying the sub-prime mortgage-backed securities that were the cause of many other investment banks' multi-billion-dollar losses.

[6] Company describes several environmental initiatives in its website: http://www2.goldmansachs.com/citizenship/environment/index.html; accessed 01/31/08.
[7] Grant recipients were Resources for the Future, World Resources Institute, and Woods Hole Research Center.

Ticker: GS (Goldman Sachs)	Asset mgt & securities services 12% Total assets: $838,201,000,000 Shareholder Equity: $35,786,000,000 Company's leased office space in NY: 3.8 million ft^2	Value of direct real estate investments: $588 million	The Ceres Investor Coalition ranked 16 U.S. banks on their climate change governance practices. The highest score for five U.S. investment banks went to Goldman Sachs (53 points). Goldman Sachs (53) Merrill Lynch (52) Morgan Stanley (49) Lehman Brothers (26) Bear Stearns (0)	
		.		
Company	**Scale, Various Measures**	**Type of Leverage**	**Environmental Initiatives**	**Market Timing**
Lehman Brothers Global investment banking, securities and	Number of employees: 25,900 Total revenue: $46,709,000,000	Similar to Goldman Sachs or any other investment bank, the company buys commercial mortgages and sells them as securities to institutional investors. They could conceivably create	Company has released several research papers, including "The Business of Climate Change II," September 2007, analyzing the future implications of climate change policy for businesses.	Compared with other Wall Street banks that are suffering huge write-downs because of the sub-prime mortgage crisis, Lehman Brothers has taken only small losses.[9]

[9] Jenny Anderson, "In Reversal, Safe Is Risky, Risky Is Safe" New York Times, November 23, 2007

investment management Headquarters: New York Ticker: LEH	Net revenue breakdown: Investment banking 18% Capital Markets 68% Asset management 14% Leased space: Americas 4.8 million ft^2 Europe 1.2 million ft^2 Asia .8 million ft^2	"green-building financing" instruments that would motivate developers to adopt certain best practices or seek LEED certification. Lehman Brothers directly owns a large amount of real estate; value of direct investments in real estate as of November 30, 2006: $9.4 billion Value of direct investments in real estate in November 2005: $7.8 billion	Lehman Brothers is a participating member of the U.S. Climate Action Partnership, a coalition of environmental groups and major corporations that are pressing the U.S. government for greenhouse gas legislation.[8] In the Ceres Investor Coalition's ranking (see above), Lehman Brothers ranked 4th out of the five major investment banks.	

Sources: Mergent Online, company websites, annual reports.

[8] Colin Rowan, "Texas will feel the heat from global warming," Austin American Statesman, January 27, 2007.

Appendix C (cont'd)

Property Management

Company	Scale, various measures	Property scale, various measures	Primary Impact on Existing or New Buildings	Environmental Initiatives	Market Timing
C.B. Richard Ellis Group, Inc. Office, retail, industrial, multi-family Los Angeles CBG	Annual revenue: $4 billion US revenue: $2.5 billion Assets: $5.9 billion Shareholder equity: $1.2 billion Transactions value, 2006: $224 billion	U.S. managed area, 2006: 1 billion sq ft Total managed area, 2006: 1.73 billion sq ft	New and existing buildings. Leasing, management, development, financial services Total offices, 2006: 352 Americas offices, 2006: 230	Plan to be carbon neutral by 2010. Plan for establishment of standards consistent with LEED, BREEAM, and/or Green Star Will enroll 100 buildings in USGBC Portfolio Program	Scale may offset negative impact of mortgage-related downturn. Recently acquired Trammell Crow, raising scale but also financial commitments.

Company	Scale, various measures	Property scale, various measures	Primary Impact on Existing or New Buildings	Environmental Initiatives	Market Timing
Jones Lang LaSalle Office, mixed-use, industrial, retail Chicago JLL	Annual revenue (2006): $2.014 billion Shareholder equity (2006): $0.750 billion Assets: $1.730 billion Management services revenue (Americas): $0.292 billion Total revenue (Americas): $0.625 billion	New and existing. Leasing, management, development, finance Managed area (total, 2006): 675 million square feet Area, all project types (2006): 1 billion+ square feet	New and existing. Leasing, management, development, financial services, REIT Offices (total, 2006): 159 Office (US, 2006): 41	Acquisition of Upstream, the leading UK real estate sustainability services company. Alliance to Save Energy named JLL a 2007 “Star of Energy Efficiency” recipient for reducing energy costs by $33 million Energy Star Partner of the Year (2007), began partnership with Energy Star in 1999	Similar to other companies; office and industrial vacancies expected to rise slightly over 2008. Development slightly larger share of portfolio than other companies

Cushman & Wakefield, Inc. Office, retail, industrial New York	Annual revenue (2006): $1.4 billion Largest privately held real estate firm.	No information available	Primarily existing. Leasing, managing, financing Offices (total): 215 in 56 countries	No information forthcoming	Similar to other companies, however development activities are not present, which avoids one major weakness in the US real estate environment
Company	**Scale, various measures**	**Property scale, various measures**	**Primary Impact on Existing or New Buildings**	**Environmental Initiatives**	**Market Timing**
Colliers International USA Office, Industrial, Retail Boston Private (Affiliation of independent firms)	Annual revenue: $1.621 billion Transactions value, 2006: $35 billion	Management (total): 675.95 million square feet	New and existing buildings. Management, development, retail services, leasing Offices (total, 2006): 267, 57 countries Offices (Americas, 2006): 129	No information forthcoming	Less diversified than some of the other firms in types of operations, but higher than average global breadth will help to compensate for weakness in US office and industrial markets.

Grubb & Ellis Primarily office Chicago GBE	Annual revenue (2007): $0.513 billion Management revenues: $0.204 billion Shareholder equity: $0.048 billion Assets: $0.269 billion	Managed area: 229 million square feet Leased area: 650,000 square feet of office space	Primarily existing. Leasing, management, broker and transaction centric. Transaction services larger portion of company than management. Management 39.8% of revenue in 2007 Offices (US): 115	No information forthcoming	Similar to other companies with respect to types of property. However, the company is heavily reliant on transactions services, which will likely decline more than management and development in the current real estate environment
Company	**Scale, various measures**	**Property scale, various measures**	**Primary Impact on Existing or New Buildings**	**Environmental Initiatives**	**Market Timing**
Transwestern Office, industrial, retail, multi-family, health Houston Private	Annual revenue, 2007: $70.6 million 500+ investment and development transactions totaling $8.5 billion (Jan 2006 – Sept 2007)	Management projects (total): 893 Managed property (total): 171 million square feet Transactions (Jan 2006 – Sept 2007): 43 million square	New and existing buildings. Development, leasing, management, investment and financial services Managed property distribution: 73% office, 22% industrial,	Reduced energy consumption by 20%-30% over unspecified period of time Energy Star Sustained Excellence Partner (2006, 2007) Pursuing LEED	Operations solely in the United States, but operations primarily office activities. Office and industrial vacancies are expected to rise slightly over the next year.

		feet 30 projects under development	5% retail All operations in the United States	certification on over 13 million square feet 50 buildings registered for LEED for Existing Buildings Operations and Maintenance program	(Hoovers reports a portfolio of 750 international properties (115 million square feet), not confirmed by the company web site.)
Hines Office, residential, mixed-use, industrial, hotel, medical, retail, sports Houston Private	Annual revenue (2007, Hoovers): $216.3 million Assets: $19.9 billion	Projects managed, developed, acquired: 1000+ Projects area: 416 million sq ft Managed property: 100 million+ sq ft Projects developed: 590+ Area developed: 175 million+ sq ft	New and existing buildings. Corporation develops, acquires, manages property, leases, and possesses a REIT Active in over 100 cities in 16 countries; 68 locations in the United States	105 properties are in Energy Star program, extent unknown 4 projects LEED certified; 10 pre-certified; 7 registered Purchases energy through its own consortium (potential rationale for reducing use)	Diversified operations, though bulk appears to be in office in high-profile locations. Heavy development presence may be affected by downturn due to restrictions in financing, and office vacancies are expected to rise slightly next year.

Sources: Mergent Online, Hoover’s, company websites, annual reports.

Appendix D. Full Profiles of Top Three Companies of Interest

Company: **Simon Property Group** **Ticker Symbol: SPG**
Headquarters: Indianapolis, IN **Year Established: 1993**

Role in Vale Chain		**Year / Source**
Segment of value chain	Owners and Developers	Mergent, unless noted
Box in value chain	REIT	
Type of real estate	Retail	
Main activities	Regional shopping malls and community shopping centers; office and mixed use. Largest U.S. owner, developer and manager of high quality retail real estate. Owns retail real estate and/or provides leasing, management, and development services	
Primary NAICS code	525930 Real Estate Investment Trusts	
Other NAICS codes		
SIC code	6798 Real Estate Investment Trusts	
Size		2006
Annual revenues	$3,332,154,000	
Assets	$1,413,093,000	
Sales		
Market capitalization	$19,735,000,000	
Employees (worldwide)	5,000	Company website
Gross leasable area Portion of GLA owned	256,000,000 121,700,000	
Number of properties	379	Company website
Additional notes on size	The company's regional malls contain 18,300 stores	

Environmental initiatives		
	Since 2004 Simon has focused on improving energy efficiency, reducing electricity use by over 10% and saving more than $11 million annually. In 2007 the company received the Leader in the Light Gold Award from the National Association of Real Estate Investment Trusts (NAREIT) in collaboration with the EPA. Currently testing pervious concrete in the parking lot of one of its shopping malls in the Midwest (helps reduce runoff).	PR Newswire Construction Digest 10 December 2007
Geographic scope	37 states; mostly FL, TX, the Midwest Canada, also has ownership interests in 59 shopping centers in France, Italy, Poland, Japan, and Mexico.	Hoover's
History and mergers	The company formed in 1993. On April 3, 2007, the company acquired The Mills Corporation in a joint venture with Farallon Capital Management, L.L.C.	
Subsidiaries	M.S. Management Associates (provides leasing, management, and development services to most of the properties). Numerous "Simon" companies The Retail Property Trust Shopping Center Associates DeBartolo Capital Partnership Rosewood Indemnity Chelsea Property Group, Inc. CPG Partners, LP	
Main competitors	General Growth Properties, Inc. Vornado Realty Trust Macerich Host Hotels & Resorts, Inc.	
Date of last update		**03-04-08**

Sources: Mergent, Hoover's, company website and annual report, Construction Digest, PR Newswire.

Appendix D (cont'd)

Company: **TIAA CREF** **Ticker Symbol:**
Headquarters: New York, NY **Year Established:**
1905

Role in Vale Chain		**Year / Source**
Segment of value chain	Finance (Equity)	
Box in value chain	Large Investors	
Type of real estate	Office, industrial, residential, commercial	
Main activities	Serves 15,000 institutional investors Retirement product offerings include supplemented retirement annuities, individual retirement annuities and tax deferred retirement plans. In the mutual fund segment, offers services in equities, fixed income, money markets and real estate funds. Provides trust management, life insurance, and tax-deferred retirement plans for self-employed individuals.	Datamonitor
Primary NAICS code	524292 Third Party Administration of Insurance and Pension Funds	Hoovers
SIC code	6371 Pension, health, and welfare funds	Hoovers
Size		
Annual revenues	$12,378,000,000	Datamonitor
Assets	405,000,000,000 $37.9 billion increase in its assets under management during the fiscal year 2006	Datamonitor
Sales		
Employees (worldwide)	5500	Datamonitor
Gross leasable area Portion of GLA owned	$12,412,233 (market value of real estate investments, includes residential properties) 64,733,000 sq ft (does not include residential properties)	Annual Report

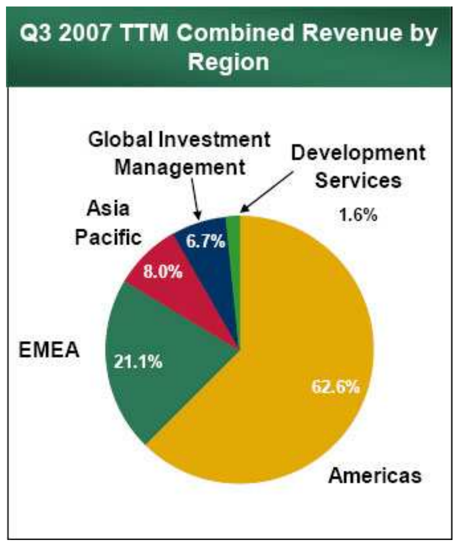
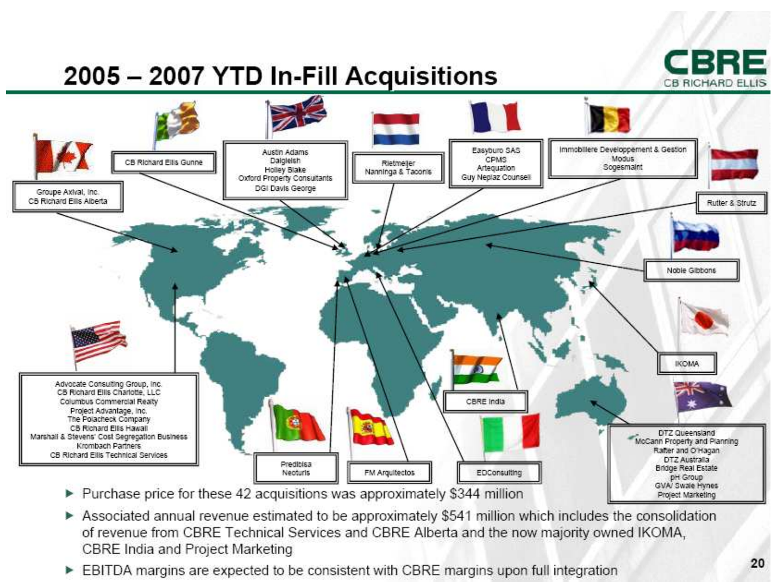
Number of properties	121	Annual Report
Rankings		
S&P 500		
FT Global 500	247	
Environmental Initiatives	Implemented EnergyStar benchmarking program across real estate portfolio to evaluate and identify viable strategies to reduce energy intensity of properties in its portfolio Seeking LEED certifications for some new construction projects Partnership with Arbor Day Foundation (an environmental non-profit) to support reforestation and e-delivery	Press Releases
Geographic scope	Although one of world's largest retirement systems with more than $400 billion in assets under management, operations are concentrated in US	Company Website
History and mergers	1905 – TIAA founded by the Carnegie Foundation for the Advancement of Teaching with $15 million as the first portable pension plan 1952 – CREF created 1980's – became indexed in the S&P average 1987 – after stock market crash, made it more flexible to participate in TIAA-CREF 1996 – went international 2003 – Insurance business sold to MetLife 2004-2006 – expansion into more 'college-towns' and acquisition of Kaspick & Company, a service provider for colleges, universities and other non-profits	Hoover's
Main competitors	FMR The Vanguard Group AIG Retirement American International Group	Hoover's Datamonitor
Date of last update		**3/04/2008**

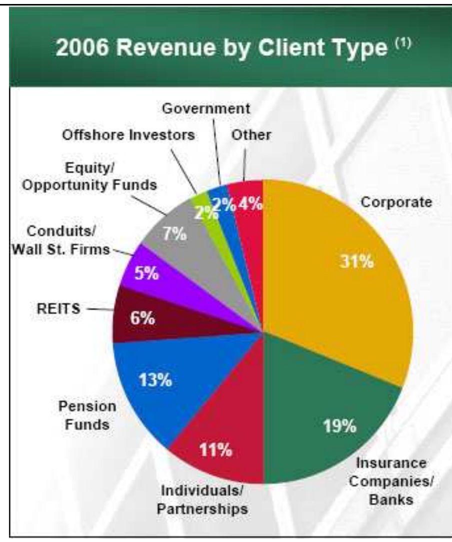
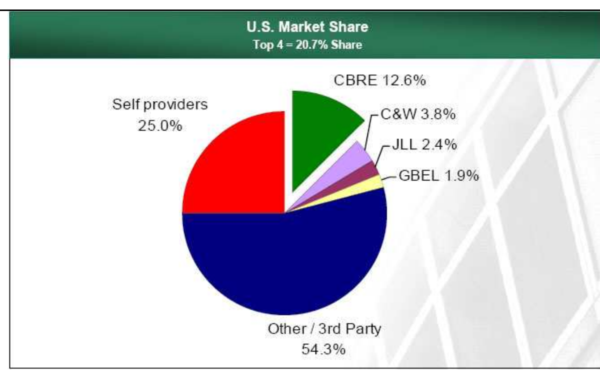
Appendix D (cont'd)

Company: CB Richard Ellis **Ticker Symbol: CBG**

Headquarters: Los Angeles, CA **Year Established: 1906**

Role in Vale Chain		**Year / Source**
Segment of value chain	Property Sales, Leasing, and Management	Mergent, unless noted
Box in value chain	Property Management	
Type of real estate	office, retail, hotels, industrial, apartments	
Main activities	Serves tenants, owners, lenders and investors in office, retail, industrial, multi-family and other commercial real estate assets. In property leasing and sales, offers strategic advice and execution assistance, forecasting, valuations, origination and servicing of commercial mortgage loans, facilities and project management and real estate investment management. In the commercial real estate services industry, offers leasing, sales, property management, facilities management, consulting, mortgage origination and servicing, valuation and appraisal services and investment management. #1 in Market Share for Property and Facilities Management	CBRE Investor Report
Primary NAICS code	531190 Lessors of Other Real Estate Property	
SIC code	6519 Real Property Lessors	
Size		2006
Annual revenues	$4,032,027,000	Annual Report
Assets	$5,900,000,000	
Employees (worldwide)	24,000	Annual Report
Gross leasable area Portion of GLA owned	1.73 billion sq ft (total property under management) $726,911,000 (value of real estate assets)	
Number of properties	352 offices	Company website

Environmental initiatives	Plan to be carbon neutral by 2010. Plan for establishment of standards consistent with LEED, BREEAM, and/or Green Star Will enroll 100 buildings in USGBC Portfolio Program	
Geographic scope	**Sales and corporate offices by region** Americas - 230 Europe, Middle East, Africa (EMEA) - 69 Asia Pacific - 53   - California accounts for 13.5% of company's global revenue	Charts pulled from CGGC Investor Presentation, November 2007

History and mergers	**History** - 1906 – Founded as Coldwell Banker after the San Francisco earthquake. Note: Coldwell Banker Real Estate today is a subsidiary of Realogy (Parsippany, NJ), not affiliated with CBRE - 1952 – Began to expand beyond California - 1998 – Merged with REI Ltd. (a real estate firm) to form CB Richard Ellis - 2003 – Merged with Insignia/ESG to become largest U.S. real estate services company - 2006 – Acquired Trammel Crow (third largest industrial developer in the United States)	
Subsidiaries	Trammel Crow	
Clients/Tenants		Chart pulled from CGGC Investor Presentation, November 2007
Main competitors	 Hoovers and Google Finance: - Cushman & Wakefield - Jones Lang LaSalle - Colliers International	Chart pulled from CGGC Investor Presentation, November 2007
Date of last update		**03/04/2008**

Appendix E. Process Memo

Introduction
Global Value Chains (GVC) analysis is an important tool that outlines how different services and resources across industries are integrated to bring a product from its conception to its end use and beyond. It depicts visually how industries are locally and globally linked, the context in which they operate, and the points of relative power in the chain.

This memo outlines how GVC analysis was applied to CGGC's recent consultancy on the real estate industry for the Environmental Defense Fund (EDF). Our task was to help EDF discern what kind of company would be in a position to induce the most positive change in the environmental impact of U.S. buildings.

We began with general questions that were designed with value chain analysis in mind.

- What are the major activities? How can we organize them into meaningful segments? How do they flow from one to another?
- Who are the major actors, and how do they interact?
- Who are the lead companies in specific markets? Overall?
- **Where is the leverage in the industry, and why?**

Step One: Identifying the Elements
We used several methods to become familiar with the industry. While none of them were ideal, applying them in combination provided a skeleton for the major actors and activities in the industry. Not all of the information gleaned was relevant, but it helped to form the operation framework of the research. We started with the following:

General Resources
To become familiar with the industry we consulted a variety of online databases such as *Plunkett's, Standard & Poor's, Hoover's, Mergent, OneSource, DataMonitor, and ReferenceUSA.* It was necessary to cross reference these sources in order to assemble a comprehensive overview and history of the U.S. real estate market.

NAICS and SIC Codes
The U.S. Census and the online databases above include indices of industry-specific codes that helped us identify primary activities, although many activities were not captured. We also used these codes to find top grossing companies by using *Ward's Business Directory*.

Industry-specific Publications
We became familiar with the websites and publications of the10-12 major trade associations that are most relevant to the U.S. real estate market. We made targeted searches of *Business Week* and *Investors Business Daily*, and frequently consulted *Commercial Property News, Realtor Magazine, Builder Magazine* and similar trade publications.

Information on Top Companies
For identifying key companies and their primary activities, we first consulted company websites, 10-K filings, and annual reports. Company profile databases were also useful, including *Mergent*, *Hoovers*, and *OneSource*.

Industry Interviews
We gathered primary data through phone interviews and email exchanges with some 30 industry professionals, including staff from CB Richard Ellis, the Fannie Mae Corporation, the U.S. Green Building Council and the U.S. Energy Information Agency. For a list of the most useful of these contacts—those that contributed significantly to this report—please see **Appendix G**.

Step Two: Constructing the Value Chain

The various activities in a given industry can naturally be divided into functional categories. The industries outlined on CGGC's North Carolina in the Global Economy website (http://www.soc.duke.edu/NC_GlobalEconomy/index.shtml) generally use Raw Materials, Components, Final Products, Distribution and Sales to group activities—in other words, groupings for a typical supply chain. In this real estate project, however, our industry interviews quickly pointed to the need to create a finance category, which we continuously modified to try to capture the dynamics between investors, lenders, and owner/developers.

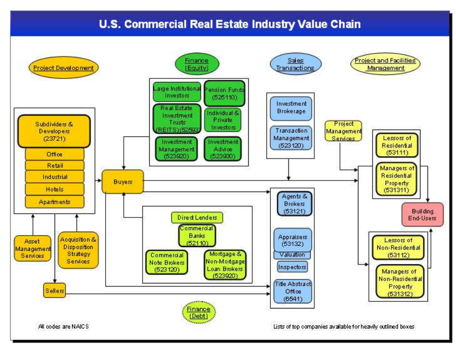


Figure 1. Initial Value Chain constructed primarily by using information from NAICS codes

At first we conceptually divided the real estate industry into Ownership and Development, Finance, Transactions, and Project Management. **Figure 1** is our first draft of the real estate industry value chain using primary elements identified from NAICS codes. The value chain continued to evolve via research with key goals of identifying leverage points in the chain, and simplifying elements and relationships with the leverage points in mind.

Step Three: Finding the Points of Leverage

We relied heavily on personal interviews with industry associations and other relevant professionals, especially in the real estate finance category, in order to get a sense of the relative leverage in each box in the value chain. Many of these contacts were useful for gaining a general orientation within any given segment. However, we found that most professionals, while

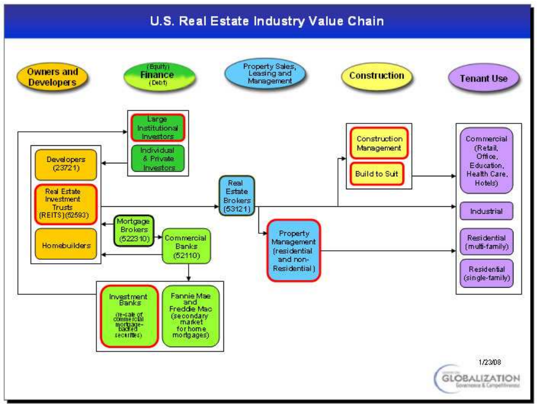


Figure 2. Subsequent Value Chain with Key Actors Identified in Bold and Red

knowledgeable about the segment they worked in, could offer no useful information outside that segment, not even in areas that were nearest to them in the value chain.

Initial key actors in the real estate value chain were identified in bold and in red in **Figure 2**, although with subsequent research we narrowed this field even further.

Next, we compiled lists of top companies in the identified 'boxes' of the value chain and gathered comparative information, including annual revenue figures, square foot figures, company overviews, and any previous environmental initiatives. In order to more precisely estimate potential leverage, we found it necessary to divide square footage into the amount that each company owned, occupied, or influenced as a provider of property management services.

Step Four: Applying the Metric

In order to translate square foot figures into a reasonable metric for comparing the relative leverage potential across companies, we devised a formula for calculating carbon dioxide emissions per square foot of real estate. This required calculating a co-efficient for each of the major relevant fuel types—electricity and natural gas—and weighting each of these co-efficients to reflect each fuel type's share of total energy used in a given type of real estate, whether office or retail, and so on. The electricity co-efficient required the extra step of calculating the weighted average of fuel stocks used across the U.S. electric grid.

We based the above calculations on the U.S. Energy Information Administration's 2007 Commercial Building Energy Consumption Survey. We also double-checked our formula with Perry Lindstrom, Greenhouse Gases and Modeling Program at EIA, who helped us arrive at the final figures. The results of these calculations appear in **Figure 3**.

Commercial Buildings C02 Emissions, by Major Fuel, 2003	Retail (Other than Mall)	Enclosed and Strip Malls	Office	Warehouse and Storage
Total energy use (million Btus)	728,000,000	1,750,000,000	2,585,000,000	879,000,000
Floor space (million square feet)	4,317	6,875	12,208	10,078
Energy use (Btus per square foot)	168,636	254,545	211,746	87,220
Electricity*				
Primary usage (million Btus)	637,000,000	1,578,000,000	2,170,000,000	738,000,000
Coefficient (lbs CO2 per million Btus)**	**131.2**	**131.2**	**131.2**	**131.2**
Estimated CO2 emitted (million tons U.S.)	41.8	103.5	142.3	48.4
Natural Gas				
Usage (million Btus)	91,000,000	172,000,000	269,000,000	132,000,000
Coefficient (CO2 per million Btus)	117.1	117.1	117.1	117.1
Estimated CO2 emitted (million tons U.S.)	5.3	10.1	15.7	7.7
Fuel Oil				
Usage (million Btus)	n/a	n/a	18,000,000	9,000,000
Coefficient (CO2 per million Btus)	153.3	153.3	153.3	153.3
Estimated CO2 emitted (million tons U.S.)	n/a	n/a	1.4	0.7
Other				
Usage (million Btus)	n/a	n/a	128,000,000	n/a
Coefficient not available				
Floor space (million square feet)	4,317	6,875	12,208	10,078
Total estimated CO2 emitted (million tons U.S.)	47	114	159	57
Estimated CO2 (pounds per square foot)	21.8	33.0	26.1	11.3

*Electricity figures refer to primary electricity, which includes thermal and transmission losses. Site electricity reflects the amount of electricity delivered to the site, and thus is used to calculate the totals for all fuels used on-site.

**Coefficient represents a weighted average for all fuel stock inputs to electric generation.

Sources: Energy Information Agency, Commercial Buildings Energy Consumption Survey, 2006; Perry Lindstrom, Energy Information Agency, personal communication, 2/6/08

http://www.eia.doe.gov/ accessed 02/05/08

Figure 3. Co-efficients used to calculate CO2 emissions per square foot.