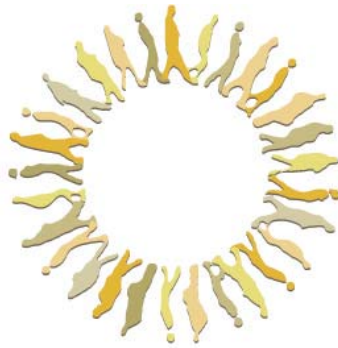


FY2006 ANNUAL REPORT



FREDERICK A. AND BARBARA M.

ERB INSTITUTE

FOR GLOBAL SUSTAINABLE ENTERPRISE

UNIVERSITY OF MICHIGAN

The Frederick A. and Barbara M. Erb Institute for Global Sustainable Enterprise is a partnership between the School of Natural Resources and Environment and the Stephen M. Ross School of Business at the University of Michigan. Our mission is to be a premier source of knowledge and leadership for the achievement of ecologically, economically and socially sustainable development and enterprise. The Erb Institute creates and disseminates leading-edge knowledge to help organizations throughout the world achieve long-term success through the harmonization of economic, environmental and social interests.



The Erb Institute would not exist without the tremendous vision and generous support of its founders and sponsors. The incredible contributions of these individuals, families and organizations have enabled us to become one of the world's premier centers for education and research related to sustainability. Donations to the Institute and its programs have allowed us to hire first-rate faculty, staff and visiting scholars, fund cutting-edge research projects, host high-impact conferences, and attract the high-caliber students who will lead us toward a sustainable future. Without the commitment of these partners, we could not think as big as we do.

Founders

Frederick A. and Barbara M. Erb

Sponsors

Diamond-level

Dow Chemical Company
Holcim (U.S.) Corporation

Platinum-level

McGraw Foundation

Gold-level

Jo Ann & Stuart C. Nathan
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Bronze-level

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CMS Energy

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Church & Dwight
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Elliot S. Pearlman

Erb Institute Alumni and External Advisory Board Members



FY2006 ANNUAL REPORT EXECUTIVE SUMMARY

The Frederick A. and Barbara M. Erb Institute for Global Sustainable Enterprise is a partnership between the School of Natural Resources and Environment and the Stephen M. Ross School of Business at the University of Michigan. Our mission is to be a premier source of knowledge and leadership for the achievement of ecologically, economically and socially sustainable development and enterprise. The Erb Institute creates and disseminates leading-edge knowledge to help organizations throughout the world achieve long-term success through the harmonization of economic, environmental and social interests.

We are pleased to report that the 2006 fiscal year (FY2006) was tremendously successful for the Erb Institute. Two years ago, we completed a comprehensive five-year strategic planning document and a significant number of goals emerged from that process. In FY2005, we successfully completed all of our near-term priorities and in FY2006, we began focusing our attention on meaningful progress toward our longer-term goals. The table below illustrates some of our recent progress toward these goals:

5-year Goal	Significant Example of FY2006 Progress
Significantly increase the research emphasis and productivity of the Institute	Hired two post-doctoral fellows for three-year appointments starting in FY2007
Attract 25 new students annually	Class of 2008 currently has an enrollment of 25 students
Enhance website to include research and learning modules for the public	Created a faculty affiliates working paper series with emerging research accessible via the web
Develop high-impact marketing campaign targeting college students and recent graduates	Developed contemporary marketing collateral, including recruiting brochures; magazine print ads and bulletin-board flyers
Attract additional funding for faculty research and student support	Helped U of M secure exclusive \$850,000 post-doc award from the Alcoa Foundation
Expand Institute staff to deliver a wider range of services with increased professionalism	Created new full-time administrative assistant position to begin in FY2007
Publish Institute-branded case studies and reports for broad-based dissemination	A compendium publication of student project work is currently being drafted



FY2006 Accomplishment Overview

Education

- Record enrollment of 55 MBA/MS students marked a 17% increase over prior year numbers
- Record first-year class of 25 MBA/MS students was 25% higher than previous record
- MBA/MS alumni expanded to 108 individuals who are working as agents of global change
- Delivered twelve courses at the intersection of business, the environment and sustainability, including courses in strategy, economics, operations and finance.
- Tom Lyon co-created and will co-teach SNRE's new *Environmental Governance* core course
- Andy Hoffman created and taught a new course on Green Construction and Design
- A group of 12 students from seven different departments created an Erb PhD student community to create an interdisciplinary dialogue to better inform their research
- Provided all third-year MBA/MS students with 50% tuition support funding

Research

- Launched Faculty Affiliates working paper series with recent works featured on Erb Institute website
- Awarded \$20K Faculty Fellow grant to Professor Michael Moore to conduct research on utility-based green electricity programs and state-based renewable portfolio standards
- Hired two post-doctoral fellows (economics and organizational strategy) who will be conducting research in residence for three years
- UM selected as the sole North American partner for the Alcoa Foundation's Conservation and Sustainability Fellowship Program, which will support six two-year post-doctoral fellows doing research on sustainable energy technology over a six-year period

Public Outreach

- Hosted a global forum focused on designing integrated strategies to combat climate change
- Sponsored and hosted nine guest speakers from the business, government and NGO communities
- Institute faculty participated in many external executive programs and speaking engagements
- Hosted two meetings of the Erb Institute External Advisory Board



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OVERVIEW

We are pleased to report that the 2006 fiscal year (FY2006) was tremendously successful for the Erb Institute. Two years ago, we completed a comprehensive five-year strategic planning document and a significant number of goals emerged from that process. In FY2005, we successfully executed all of our near-term priorities and in FY2006, we began focusing our attention on meaningful progress toward our longer-term goals. The table below illustrates some of our recent progress toward these goals:

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EDUCATION

MBA/MS Enrollments

The Erb Institute MBA/MS Program enrolled 55 students in FY2006, which represents an increase of 80% over the past three years. International students accounted for 10% of our population, including students from Canada, China, Germany, Japan and Thailand. Women comprised 42% of the student body, which was up from 38% the previous year and slightly below our historical average of 45%. For purposes of comparison, the RSB MBA program had an international enrollment of 34% and a female enrollment of 31% during FY2006.

During the year, three 2nd-year students opted out of the dual-degree program and graduated with only the MBA degree. Despite this attrition, the Class of 2007 remains on track to be our largest graduating class to date with 18 students. The Class of 2008, which began the year with 16 students, has since grown by an additional 56%, with three SNRE students gaining acceptance to RSB and six RSB students gaining acceptance to SNRE. At 25 students, the class of 2008 is easily our largest class to date. The newly entering Class of 2009 currently stands at 16 students and we expect this class size to grow before the next school year is complete.

The greatest testament to the quality of our MBA/MS Program remains the average historical yield rate of 83%. In other words, for every 20 students who are admitted to the program, only three choose to enroll elsewhere. With respect to the incoming Class of 2009, 78% of admitted students elected to come to Michigan and enroll in our MBA/MS Program.

MBA/MS Placements

In FY2005, Erb Institute MBA/MS students continued to take full advantage of their two summer internship opportunities by going to work for a wide range of organizations located as near as Ann Arbor and as far away as Ghana¹. The Erb Institute also continued its practice of providing supplemental funding for students who pursue opportunities with non-profit and governmental organizations, which typically offer lower rates of compensation. Our 2006 graduates are now employed with a wide variety of organizations, including positions with multi-national companies, non-governmental organizations and entrepreneurial start-ups

MBA/MS Alumni

With 12 students graduating in 2006, the Erb Institute alumni community expanded to 108 individuals who draw upon their interdisciplinary training to inspire, develop and implement innovative and practicable methods for cultivating a sustainable future². These alumni are based throughout the United States and the world and actively hold positions of leadership within multinational corporations (40%), non-profit and government organizations (25%), consulting firms (20%), and small businesses (15%). A notable alumni accomplishment in FY2006 was that *Kevin Greiner ('97)* was named President and CEO of Gas South LLC – a newly formed natural gas retailer, which was spun off from the Southern Company.

¹ Please refer to Appendix A for a list of recent summer internship placements.

² Please refer to Appendix B for a complete list of Erb Institute alumni and their occupations



Course Offerings

In FY2006, twelve courses were offered at the intersection of business, the environment and sustainability³. All of these courses are designed to provide our MBA/MS students with the foundational knowledge needed to be successful in their careers. It is important to note that many single-degree students from Ross, SNRE and other schools also enroll in and benefit from these courses. FY2006 course offerings are shown below with enrollments in parentheses:

- Business Practices of Human Rights (17)
- Systems Thinking for Sustainable Development and Enterprise (27)
- Erb Institute Seminar (29)
- Competitive Environmental Strategy (34)
- Strategies for Sustainable Development (29)
- Sustainable Manufacturing (15)
- Finance and the Sustainable Enterprise (28)
- Non-Market Strategy: Shaping the Rules of the Game (36)
- Social Institutions for Energy Production (25)
- Green Construction (49)
- Business Strategy for the Base of the Pyramid (35)
- Social Enterprise (46)

MBA/MS Student Theses

In all, the three core faculty members of the Erb Institute advised the thesis work of 38 Masters students in FY2006, with many of these works still in progress. The list of Masters theses completed by Erb Institute MBA/MS in FY2006 is featured below⁴.

Life-Cycle Optimization of Residential Clothes Washer Replacement

Richard Bole

Business Case for Sustainability at Cummins, Inc.

Rina Horiuchi, Sarah Nosanchuk, Alexis Olans, Kari Walworth

An Economic Analysis of the DTE Energy Hydrogen Technology Park

Ed Chao, Marshall Chase, Kris Jadd

Some Benefits of Nearby Nature for Hospital Visitors: Restorative Walks in Nichols Arboretum

Katy Levine

³ Please refer to Appendix C for descriptions of institute courses

⁴ Please refer to Appendix D to see abstracts for each of these theses.



PhD Students

With an increasing number of PhD students being advised by Erb Institute faculty, a group of 12 PhD students from five different schools across campus have joined forces to create an Erb PhD student community. The research of each of these individuals focuses on sustainable enterprise, with each approaching this subject matter from their own disciplinary perspective. The goal for this community is to facilitate an interdisciplinary dialogue that informs their current research and develops boundary-spanning skills that they can draw on throughout their careers. The PhD student group will be spearheading the *Erb Colloquium* initiative in the year ahead, which will bring together university researchers twice monthly to present and critique one another's current research.

Curriculum Development

The Institute was involved with three notable curriculum development initiatives in FY2006:

- Professor Tom Lyon co-created the new Social Science core course for the School of Natural Resources and Environment, which will be a mandatory course for all first-year SNRE MS students. The course, entitled *Environmental Governance: Choices, Institutions and Outcomes*, reviews the principal concepts and techniques in the social sciences that are relevant to environmental policy.
- Professor Andy Hoffman, with help from Erb MBA/MS student Doug Wein, developed and taught a new course on Green Construction and Design. The initial offering of this experimental course attracted a remarkable 49 students and the course will now become a regular offering.
- The Ross School of Business recently revamped and expanded the BBA program and is in the process of developing new coursework to meet student needs. On the heels of this effort, the Erb Institute has engaged a group of six senior faculty from the Ross School to explore the creation of a Sustainable Enterprise track at the BBA level. Exploratory fact-finding in this regard will take place in the year ahead.



RESEARCH

Research Themes

The core faculty members of the Erb Institute are engaged in a wide range of research initiatives related to global sustainable enterprise. The specific set of issues upon which the Erb Institute focuses will change over time in response to global developments. However, three broad issues currently occupy much of our research effort:

- Strategic Dimensions of Climate Change;
- Sustainable Mobility & Accessibility; and
- Sustainable Energy Futures.

Post-Doctoral Fellows

The Erb Institute hired two post-doctoral fellows who will significantly bolster our research productivity over the next three years. Haitao Yin is an economist who recently earned his PhD from the Wharton School at the University of Pennsylvania. He will be investigating the variability of environmental performance across ISO 14001 certified firms. Stephanie Bertels is an Organizational Behaviorist who recently earned her PhD from the Haskayne School at the University of Calgary. She will be exploring how motivations drive what role organizations play in furthering sustainable development.

Faculty Affiliates and Fellows

The Erb Institute Faculty Affiliates Program encourages the development of interdisciplinary research and teaching proposals related to global sustainable enterprise. In FY2006, membership in the program grew to 32 professors, representing more than one dozen schools, colleges and departments across campus. In conjunction with this program, the Erb Institute recently launched a working paper series, which features the latest works of research being conducted by these individuals. These working papers are featured on the Erb Institute website.

In FY2006, the Erb Institute awarded its first Faculty Fellowship to a member of the Faculty Affiliates group. The award took the form of \$20,000 proposal from SNRE economics professor Michael Moore. Professor Moore will use the grant to gain further insight into two types of programs leading to major expansions in generation of renewable based electricity – utility-based green electricity programs and state-based renewable portfolio standards. His research will investigate policy coordination problems in conceptual, legal, and empirical terms. The anticipated product will be an article in an environmental law journal (Harvard Environmental Law Review or Ecology Law Quarterly) or an energy journal (Energy Policy).



Core Faculty Publications

A sample of Erb Institute faculty publications for FY2006 are featured below:

Thomas N. Gladwin, Max McGraw Professor of Sustainable Enterprise

- “A Complex Systems Approach to Sustainable Accessibility,” in Center for Transportation Studies, Access to Destinations Conference Proceedings, University of Minnesota (June 2005).
- With Ben Vander Pluijm and David Allan, *Global Change: Introduction to Earth Systems and Sustainability* (New York: W.W. Norton in collaboration with The Worldwatch Institute, in preparation).

Andrew J. Hoffman, Holcim (US) Professor of Sustainable Enterprise

- “The ‘carbon cartel’ or wise capitalists: What is going on with voluntary greenhouse gas reductions?” *American Bar Association Air Quality Newsletter*, 9 (1) (November, 2005): 3-7.
- “Climate change strategy: The business logic behind voluntary greenhouse gas reductions,” *California Management Review*, Spring 2005, 47: 21-46.
- “Business decisions and the environment: Significance, challenges, and momentum of an emerging research field,” in G. Brewer and P. Stern (eds.) *Decision Making for the Environment: Social and Behavioral Science Research Priorities* (Washington DC: National Research Council, National Academies Press): 200-229.
- “Environmental pollution,” in D. Stille (ed.) *The World Book Yearbook*, (Chicago: World Book)

Thomas P. Lyon, Dow Professor of Sustainable Science, Technology and Commerce

- *Regulation*, (editor), Edward Elgar Press, forthcoming.
- “Voluntary Environmental Agreements when Regulatory Capacity is Weak,” *Comparative Economic Systems*, with Allen Blackman and Nicholas Sisto, forthcoming.
- “Does Dual Sourcing Lower Procurement Costs?,” *Journal of Industrial Economics*, June 2006, 54: 223-252.
- “Regulatory Opportunism and Investment Behavior: Evidence from the Electric Utility Industry,” (with John P. Mayo), *RAND Journal of Economics*, Autumn 2005, 36: 628-644



PUBLIC OUTREACH

As a public institution, the University of Michigan takes seriously its duty to reach out and serve the community at large. Sharing that mandate, the Erb Institute devotes considerable energy to outreach activities such as conferences, speaker series, and workshops. Specific examples of these outreach activities are featured below.

Major Conferences

"Business and Climate Change: Designing Integrated Strategies"

This conference underscored the fact that mounting scientific evidence, heightened public awareness, and a recent sense of the Senate Resolution all suggest an increased likelihood of action in the United States aimed at regulating greenhouse gas emissions. In response to this changing environment, many businesses have begun to position their products and processes for a carbon-constrained future. Yet large uncertainties remain about what type of climate regime will emerge. Further, the risks and opportunities associated with climate policy vary widely across US industry---regulated electric utilities likely can pass carbon costs through to consumers, while automobile manufacturers worry that climate policy will add yet another burden to the enormous economic challenges they already face. In this dynamic environment, simply opposing climate policy is to cede the opportunity for influence to players offering possible alternatives. A successful business strategy calls for integrating core market activities with activities in the public arena. Different companies will inevitably come to different positions regarding appropriate public policies. Yet they all can benefit from being able to discuss their views with representatives from government, environmental groups, and scholars in a non-partisan environment such as that provided by the Erb Institute.

Guest Speaker Events

In addition to the larger conferences described above, the Erb Institute also sponsored a number of smaller events during FY2006 that were designed to enrich the learning community for both university students and the broader community. These events included a film series featuring complex stories related to sustainable enterprise. Participants watched these films and then discussed and debated the issues that were brought to light. The Institute also hosts an ongoing Speaker Series, which features distinguished speakers from the corporate, nonprofit and government sectors. A list of FY2006 speakers is included below.



Peter Mertz

CEO, Global Forest Partners

"Timberland Investment as a Portfolio Hedge"

William L. Thomas

Counsel, Environmental Practice Leader, Clifford Chance US LLP

"Globalization, the Environment, and Corporate Law"

C.K. Prahalad

McCracken Distinguished Professor of Corporate Strategy, University of Michigan

"The Fortune at the Bottom of the Pyramid"

Debra Meyerson

Associate Professor of Education and Organizational Behavior, Stanford University

"Living Your Values and Effecting Change through Tempered Radicalism"

Mel Jones

President and CEO, Sterling Planet

"An Insider's Perspective on the Renewable Energy Industry"

Dr. Alan Hecht

Director, Sustainable Development, United States Environmental Protection Agency

"The EPA at 50: A Vision for 2020"

Anne Rolfes

Director, Louisiana Bucket Brigade

"Environmental Justice Post-Katrina: Empowering Communities in Cancer Alley, Louisiana"

David Rinard

Director of Corporate Environmental Performance, Steelcase

"Building Change: A Business Perspective on Green Construction and Design for Environment"

James N. Levitt

Director of the Program on Conservation Innovation at Harvard Forest

"From Walden to Wall Street: Innovations in Conservation Finance"

Other Event Sponsorships

Net Impact MBA Idealist 2006: "Forging Links: Connecting People, Business & the Future"

Organizational Studies 2006 Conference on Corporate Social Responsibility

Ross School of Business 2006 Go Blue Rendezvous

BSR 2005 Annual Conference, "Questioning Assumptions -- Changing Frameworks".

Bioneers 2005 Conference



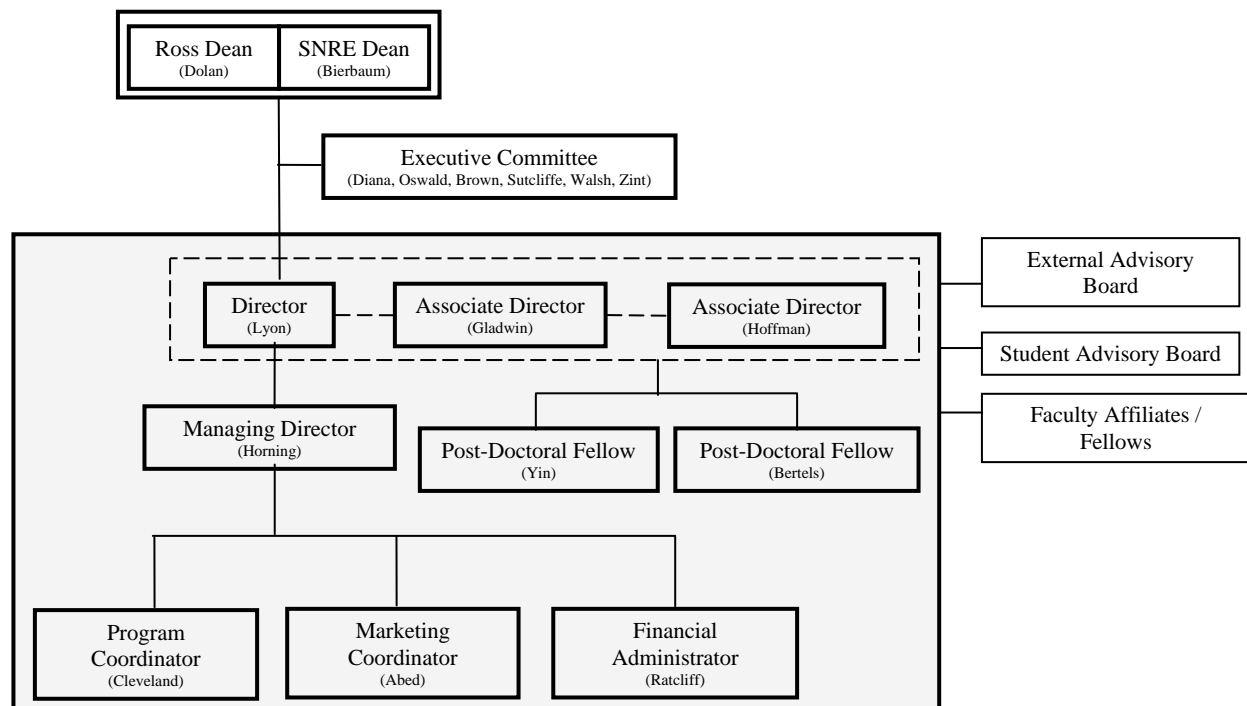
ORGANIZATION

Faculty & Staff

With continued growth of the Erb Institute, the need for staff support also increases. The Institute recently hired Dominique Abed to handle a wide range of administrative duties, with primary responsibility for marketing initiatives and major events management. In the interest of streamlining communications and reporting processes, the Deans of Ross and SNRE have decided to implement a faculty governance model that designates one primary Director for the Institute. For the 2006-07 academic year, Tom Lyon will serve in this role, with Tom Gladwin and Andy Hoffman serving as Associate Directors. All three core faculty members will continue to be intimately involved with shaping the Institute's education, research and outreach programs.

Figure 1 (below) illustrates the organizational structure of the Institute for the year ahead. Bios of institute directors are attached as Appendix E and descriptions of affiliated boards and committees are described below.

Figure 1: Erb Institute Organizational Structure





Executive Committee

The Erb Institute Executive Committee consists of one Associate Dean from both MBS and SNRE and two additional faculty members from each school. The purpose of the committee is:

- To provide School-level feedback and guidance to the Institute leadership team, who have responsibility for formulating strategy and delivering services, and
- To provide Deans with impartial perspective regarding Institute strategies and activities.

Executive Committee members for FY2006 included:

Daniel G. Brown, Ph.D.
Izak Duenyas, Ph.D.

James S. Diana, Ph.D.
James P. Walsh, Ph.D.

Lynda J. Oswald, J.D.
Michaela T. Zint, Ph.D.

External Advisory Board

Our External Advisory Board (EAB) is comprised of individuals who represent the diversity of industries and institutions where the work of the Erb Institute and its students has the greatest impact.. EAB members attend semi-annual meetings on campus and are a source of advice and counsel to faculty, staff and students regarding program structure, content, and marketing. After conducting a thorough assessment of the expertise represented on the EAB, we engaged in significant efforts in the last year to enhance and strengthen EAB membership. Since our 2005 reporting period, the following individuals have become members of the Erb Institute External Advisory Board:

Mel Jones
President and CEO
Sterling Planet

Alan Hecht
Director of Sustainable Development
U.S. Environmental Protection Agency

For a complete list of EAB members, please refer to Appendix F.

Student Advisory Board (SAB)

MBA/MS students play an important role in the development of the Erb Institute activities. These efforts are led by the six-member Student Advisory Board (SAB), which facilitates and continuously improves communication between students, faculty, staff, alumni, and the EAB; helps define and coordinate completion of a set of strategic goals each year; ensures accountability for student, faculty and staff commitments; and fosters leadership, enthusiasm and fun among students. FY2006 Members included:

Class of 2006
Kate Napolitan
Marshall Chase

Class of 2007
Bodhi Burgess
Kate Napolitan

Class of 2008
Michele Diener
Josh Nothwang



MARKETING

Two years ago, as part of a major re-branding effort, the Institute created a powerful new brand mark that captures the visionary mission and the environmental, social and global aspects of the institute. In FY2006, we began leveraging our new mark by developing high-impact brochures and magazine advertisements. Two examples of these media are highlighted below:

Figure 2: Organizational Partner Brochure Cover



Figure 3: Sierra Magazine Advertisement





FINANCIALS

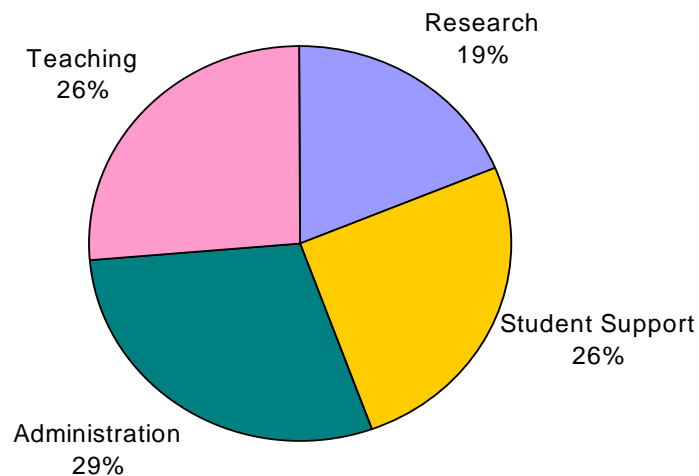
Sources and Uses of Funds

Primary funding for the Erb Institute is made possible through the gifts of generous donors. Table 2 (below) illustrates the current sources of funding to support activities of the Institute. Chart 1 (below) illustrates the allocation of funding to the various activities of the Institute.

Table 2: Sources of Funds

Funding Source	Endowment Book Value at Maturity	Final Payment Year	Endowment Market Value (6/30/05)	Endowment Market Value (6/30/06)	Change in Market Value	FY2006 Distributions / Expendables
Erb – Operating	\$18,875,000	2014	\$13,717,943	\$16,660,596	\$2,942,653	\$648,664
Holcim – Professor	\$2,500,000	Complete	\$2,826,920	\$3,203,026	\$376,106	\$126,728
Dow – Professor	\$2,000,000	Complete	\$1,762,670	\$2,414,724	\$652,054	\$87,552
McGraw – Professor	\$1,200,000	Complete	\$2,591,172	\$2,935,913	\$344,741	\$116,160
Nathan – Student	\$700,000	2007	\$916,364	\$1,038,280	\$121,916	\$41,078
Vincent – Student	\$300,000	Complete	\$455,796	\$516,437	\$60,641	\$20,432
Pharmacia – Student	\$250,000	Complete	\$404,127	\$457,893	\$53,766	\$18,116
Pharmacia – Research	\$250,000	Complete	\$404,127	\$457,893	\$53,766	\$18,116
Dow – Student	\$250,000	Complete	\$274,138	\$310,610	\$36,472	\$12,289
Expendable Gifts	NA	NA	NA	NA	NA	\$149,788
TOTAL	\$28,450,000	NA	\$18,778,050	\$27,995,372	\$4,642,115	\$1,238,923

Chart 1: Uses of Funds





CONCLUSION

The 2005 fiscal year proved notable in the growth and development of the Erb Institute. With record enrollments in the MBA/MS program, a new PhD student community, the hiring of two post-doctoral fellows and the expansion of our faculty affiliates program, the Institute is poised to greatly advance its impact in the year ahead. We are now hard at work on new initiatives in the areas of curriculum development, research and public outreach and we are eager to make significant progress on all of these fronts over the next several months.

Regarding Institute resources, we are blessed to have significant endowments in place to secure the future of the Erb Institute. However, with the fast growth of our initiatives and expansion of our community, the need to attract new funding sources remains a top priority. With their most recent \$10 million gift, Fred and Barbara Erb challenged us to attract comparable support from other sources by 2014. This represents a significant challenge for the Institute, but we are confident that this goal can be met with the help of our extensive community of stakeholders.

The Erb Institute is extremely grateful to our tremendous students, alumni, faculty, staff, advisory board members, organizational partners and donors. The continual interaction of this collaborative network has allowed the Erb Institute to become a premier academic center focused on topics of global sustainable enterprise. The global challenges upon which the Institute focuses – such as climate change, sustainable mobility, renewable energy, and the depletion of natural capital – are not easily resolvable. Workable solutions to these problems require that we reach across boundaries and develop revolutionary strategies that draw on a wide range of disciplines and ideas. In the year ahead, we look forward to continuing our collaborative efforts to achieve meaningful progress toward a sustainable future.



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FOR GLOBAL SUSTAINABLE ENTERPRISE
UNIVERSITY OF MICHIGAN

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APPENDICES



APPENDIX A: MBA/MS Student Internships

CLASS	STUDENT	2006 SUMMER INTERNSHIP	LOCATION
2007	Bodhi Burgess	Piper Jaffray	San Francisco, CA
2007	Doug Glancy	Swiss Re	New York, NY
2007	Chris Guenther	SustainAbility	Washington DC
2007	Sarah Hines	Ford Motor Company	Dearborn, MI
2007	Mike Horn	Weyerhaeuser	Seattle, WA
2007	Alex Keros	General Motors	Rochester, MI
2007	Jessica Lin	Coca-Cola Company	Atlanta, GA
2007	Jeff Martin	Energy Conversion Devices - UniSolar	Rochester Hills, MI
2007	Niko Meisner	Ford Motor Company	Dearborn, MI
2007	Alexis Olans	P&G / Business for Social Responsibility	OH and CA
2007	Scott Pryor	Gas South	Atlanta, GA
2007	Karen Putterman	John Deere	IL, ND, and Russia
2007	Greg Shopoff	Domestic Corps	Bozeman, MT
2007	Matt Stout	STM Power	Ann Arbor, MI
2007	Cris Turney	Ford Motor Company	Dearborn, MI
2007	Doug Wein	CTG Energetics	Irvine, CA
2008	Sarah Winkeller	Johnson & Johnson	Skillman, NJ
2008	Kipp Baratoff	E+Co	Ghana, Africa
2008	Ian Black	Ameriprise	Minneapolis, MN
2008	Caroline Conway	John Deere	IL, ND, and Russia
2008	Michele Diener	Sustainable Conservation	San Francisco, CA
2008	Mike Edison	Center for Sustainable Systems	Ann Arbor, MI
2008	Kate Elliott	Center for Sustainable Systems	Ann Arbor, MI
2008	Justin Felt	Dow Chemical Company	Houston, TX
2008	Matt Garratt	E+Co	Ghana, Africa
2008	John Gearen	Energy Conversion Devices	Rochester Hills, MI
2008	Christina Gilyutin	Cisco Systems	San Jose, CA
2008	Tony Gross	Bristol-Myers Squibb	Princeton, NJ
2008	Laura Kaminski	Great Lakes Commission	Ann Arbor, MI
2008	Fred Nelson	Tanzania Natural Resource Forum	Tanzania, Africa
2008	Josh Nothwang	Ford Motor Company	Dearborn, MI
2008	Amisha Parekh	Procter and Gamble	Cincinnati, OH
2008	Rachel Permut	Center for Sustainable Systems	Ann Arbor, MI
2008	Terri Schroeder	Ford Motor Company	Dearborn, MI
2008	Brian Swett	Business for Social Responsibility	California
2008	Mae Vichitkulwongsa	Energy Conversion Devices - Ovonics	Rochester Hills, MI
2008	Dan Wang	National Park Service	San Francisco, CA
2008	Annie White	Wal-Mart Stores, Inc.	Bentonville, AR
2008	Mitch Yamamoto	Ross Controls / Recycle One	Michigan / Japan



APPENDIX B: MBA/MS Program Alumni

CLASS OF 1995

Laura Rubin
Huron River Watershed Council

CLASS OF 1996

Catie Blackler
Eastman Kodak

Carl Ferguson
Land Information Access Association

Greg Gamble
The Nature Conservancy

Paul Hardy
The Nature Conservancy

Carey Jones
Gower Design Group LLC

Jonathan Koch
US Renewables Group

Cherie Levin McDermott
Energy Innovation Group, LLC

Cynthia Manson
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Full-time Mom

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Sperry Van Ness Skeeters & Associates

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Ryan Waddington
NextEnergy

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Kathleen Judd
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Interfip SAB

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Michigan Environmental Council

Andrew Horning
University of Michigan

Matt Johnson
Gaia Power Technologies

Sangeeta Labhsetwar
Rse Consulting

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Pacific Ethanol, Inc.

Asako Nagai
Sony Corporation

Alan Phipps
Phipps Associates, Inc.

Elyse Steiner
U.S. Environmental Protection Agency

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SustainAbility

Megan DeYoung
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Tad Dritz
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Visteon

Jed Van Dyke
VanDyke Systems

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Interface Flooring Systems

Jay West
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Samantha Sturhahn
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Root Learning

Brian Cooper
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Steph Cuttler
Calvert

Alison Dimond
ASG Renaissance



Elizabeth Fastiggi
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Ajay Gupta
Cummins Power Generation

Nadia Herb
Full-time Mom

Jamie Lloyd
Tidewater Plantations, Inc.

Lisa Monzon
The Packard Foundation

Jonathan Newton
Ford Motor Company

Nikole Reaksecker
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Jake Swenson
Staples, Inc.

Nuyi Tao
World Bank

Mark Tholke
Eurus Energy America

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GE Wind Energy

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Richard Chandler
White House Office of Mgmt & Budget

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CitiGroup

Ruchi Misra
Business for Social Responsibility

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Scott Ward
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Emily Collings
Weyerhaeuser

Nick Cucinelli
Energy Conversion Devices

Ted Ekkers
Target Corporation

Jonathan Forrester
PG&E

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Meridian Institute

Liz Hamilton
Stonyfield Farm

Michael Hokenson
Minlam Asset Management

Heather Kirshman
Bosch Fellow

Howard Lin
Lin Enterprises

Bryan Magnus
Honeywell Corporation

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Eric Wingfield
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Ed Chao
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Laura Flanigan

Aaron Harris
General Electric

Rina Horiuchi
Business for Social Responsibility

Kris Jadd
Chevron

Katy Levine
Cisco Systems

Kate Napolitan
Eaton

Sara Nosanchuk

Nancy Poderycki
Toyota

Kari Walworth
Full-time Mom



APPENDIX C: Sustainable Enterprise Courses

Systems Thinking for Sustainable Development and Enterprise

Thomas Gladwin, Max McGraw Professor of Sustainable Enterprise

Students will develop critical skills of Global Systems Thinking (note that the phrase “global” has two meanings in this course: a) of, relating to, or involving the entire world, and b) of, relating to, or embracing all considerations in a complex system). Students will also develop a set of communicating, visioning and conversational skills associated with systemic leadership for a sustainable future. Students will acquire the skills of Systems Dynamics Modeling using state-of-the-art simulation software for enhancing mental models and understanding of complex systems – via active and participative learning by doing (i.e., building and simulating models of dynamic systems and processes regarding issues of global change). The course strives to foster awareness, sensitivity and literacy regarding Global Environmental and Social Change, including challenges such as population growth, persistent poverty, social disintegration, biodiversity loss, climate change, freshwater scarcity, gender bias, megacities, food insecurity, political instability, etc., focusing especially on the roles of industry in relation to these challenges. The course will help students better understand Sustainable Human Development and Enterprise as an ongoing, adaptive learning process, examining “what if” possibilities regarding future development pathways and exploring the most promising opportunities for business in helping to ensure that human needs are met while the planet’s environment is nurtured and restored.

Competitive Environmental Strategy

Andrew Hoffman, Holcim (US) Professor of Sustainable Enterprise

The goal of this course will be to explore this question from a political, managerial and technological perspective. It is not our intention to make students fully proficient in the structure of environmental law or the scope of global environmental hazards. As needed, class discussions will be augmented to provide necessary background. We will focus instead on the significance of these developments for corporate organization, markets, and operations. We will look at both established industries and emergent companies employing cutting edge technologies, and consider both national and international implications. This class is not aimed at the environmentalist. There is ample reason for critical thinking in an era when political correctness can cloud the logic of rational discourse. What the student should take away from the course is a grasp of the emerging complexity of the environmental issue, its opportunities and limitations for the corporate enterprise. In the final analysis, environmentalism is a fact of the business environment, like it or not. To successfully address this fact, one needs to see that it offers a new lens with which to view taken-for-granted conceptions of basic products and processes.

Strategies for Sustainable Development

Andrew Hoffman, Holcim (US) Professor of Sustainable Enterprise

While the term sustainable development (or sustainability) dates back to the 1970s, the most frequently cited definition comes from the 1987 Bruntland Commission report which called for development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” Giving more structure to this definition, sustainability has been described as focusing on the “triple bottom line,” the need to balance the three E’s in the global economy: (1) economic prosperity, (2) environmental quality and (3) social equity.

The values that underlie these metrics appear to be divergent from the presently accepted measures and objectives of economic growth and business strategy. And integrating the values underlying these notions into the market system poses a serious challenge to business managers trying to understand what is expected of them and their companies. In this course, we will explore how some of them are doing this and consider what more may be expected from business in the present and future business environment.



Erb Institute Seminar

Andrew Hoffman, Holcim (US) Professor of Sustainable Enterprise

Emerging Issues for Sustainable Business surveys the integration of science and business on behalf of a sustainable human future. It is designed to enable new Erb MBA/MS students to 1) discover what each believes about sustainable development and enterprise; 2) pinpoint what each wants to know and endeavor to learn while in the program; and 3) facilitate careful reflection about each student's future path through life and work after they graduate. The Seminar focuses on seven intellectual foundations of sustainability: challenge, philosophy, science, connectivity, institutions, motivation and transformation.

Non-Market Strategy: Shaping the Rules of the Game

Thomas P. Lyon, Dow Chemical Professor of Sustainable Science, Technology & Commerce

Most business courses teach you how to play the game of business within the rules. This course is about the rules themselves, their creation and their enforcement. While a firm's competitive advantage is created in large part through developing and exploiting difficult-to-imitate capabilities and resources in the market environment, the non-market environment in which the firm operates also presents important risks and opportunities for business leaders. Many barriers to imitation derive from legal rules or public policies that favor certain capabilities over others. These policies are not exogenously given. They are instead the outcome of competition between businesses and other groups within public institutions. In many industries, corporate activity in the policymaking and judicial process is a key element in creating or maintaining a company's competitive advantage.

Social Institutions for Energy Production

Thomas P. Lyon, Dow Chemical Professor of Sustainable Science, Technology & Commerce

The goal of this course is to give you a coherent understanding of the institutions that govern energy use, so that you can play a more effective role in shaping future policy or business decisions. We will begin with basic scientific and technological facts regarding the major uses for and sources of energy. We will then study energy markets (including spot and futures markets), and what they are capable of accomplishing; we will also study the ways energy markets may fail. This will lead into an overview of the role of government in influencing energy decisions. We will begin with a high-level perspective, but quickly begin working with a series of case studies that examine in depth what government has accomplished in the area of energy policy.

Business Practices of Human Rights

David Berdish, Corporate Governance Manager, Ford Motor Company

The purpose of this course is to introduce the theory and practice of human rights into business and corporate social responsibility. The people in this course will learn about the problems, policies, risks and opportunities for leadership and how corporations can influence the global economy and positively impact the societies in which they operate.

Sustainable Manufacturing

F. Brian Talbot, David B. Hermelin Professor of Business Administration

The course will examine some of the most important environmental and worker rights laws and political, economic and technical realities that directly affect manufacturing, and the challenges and opportunities they are bringing to the world of manufacturing. The basic question is: "How to profitably produce products in an environmentally and humanly sustainable manner?" A successful student will leave the course a) with a much deeper understanding of these major forces shaping manufacturing; b) better able to analyze and make decisions involving complex tradeoffs across economic, technological, ethical, human rights and environmental dimensions; and, c) more creative in identifying profitable business opportunities that address these difficult tradeoffs.



Finance and the Sustainable Enterprise

Gautam Kaul, John C. and Sally S. Morley Professor of Finance

This course will begin with the assumption that the frameworks provided by economics and finance can, with appropriate modifications, help us understand and deal with the unique issues faced by a sustainable business. Since the issues that challenge the sustainability of the modern enterprise are both varied and complex, this course will largely (though not solely) focus on environmental issues related to Climate Change. We will address the financial and valuation issues faced by a sustainable enterprise from the perspective of a typical firm whose objective is to maximize shareholder value, but is now increasingly confronted by a slew of environmental issues that have real effects. We will critically evaluate the viability of the assumptions and institutions necessary to ensure the success of any modern firm in achieving its objective of maximizing shareholder, without adversely affecting societal value. More importantly, we will modify existing economic and financial frameworks to study the effects of new and emerging regulatory and strategic environmental issues on the value of projects and firms.

Green Construction and Design Seminar

Andrew Hoffman, Holcim (US) Professor of Sustainable Enterprise

The goal of this seminar is to explore this question from a variety of perspectives. It will be a seminar based primarily on hearing from professionals within the field; those who are trying to change the state of green construction in the US today. It is not its intention to make students fully proficient in the intricacies of green construction techniques. It is intended, instead, to make students aware of green construction issues, so that they will be aware of the range of knowledge and issues that exists. Every student that takes this seminar may one day be involved in the design of a new home or office building. In that position, they will have the opportunity to shape that living or working space so that it reduces its burden on the environment, both for that users benefit and the benefit of generations to come.

Social Enterprise: Innovation in the Information Society

Michael Gordon, Arthur F. Thurnau Professor of Business and Information Technology

Social Enterprise roughly means making the world better through the efforts of for-profits or non-profits and broadly covers problems in the areas of poverty, health, education, the environment, and other social issues, such as treating women and children better. We will pay significant attention to how companies working at the economic bottom of the pyramid can develop successful businesses, though we will focus on other opportunities as well. We will see how many innovations in this area embrace new business approaches supported by information and communication technology (ICT). Although not all societal problems are good candidates for ICT support, many are ? and it may surprise you how business and other organizations are responding. We will look at examples of successful ICT efforts in the social enterprise arena, try to spot trends, and look for frameworks. We will see that part of what makes social enterprise work is finding ways to adopt innovative perspectives and devise innovative solutions.

Business Strategies for the Base of the Pyramid

Ted London, Adjunct Professor of Business Administration

As corporations search for new avenues of profitable growth and innovation, they have increasingly turned to a unique, counterintuitive opportunity - the four billion poor that live at the base of economic pyramid. Converting the poor into active market participants requires radical innovation in business models and technology development. Given the unique competitive context, formulating business strategies for base of the pyramid markets will require a different map and set of navigational tools than those presented in conventional models of corporate strategy. This course integrates concepts from strategy, international business, entrepreneurship, and sustainable enterprise to stimulate the leadership skills and competitive imagination needed to design strategies for the base of the pyramid. Through a combination of cases, readings, lectures, videos, and guest speakers, the class will engage students in discussions aimed at (1) identifying business opportunities and (2) developing strategies and business models required to productively explore those opportunities.

**APPENDIX D: MBA/MS Student Master's Projects and Theses**

- Project:** **A Business Case for Sustainability at Cummins, Inc.**
Student(s): *Rina Horiuchi '06, Sara Nosanchuk '06, Alexis Olans '07, Kari Walworth '06*
Overview: This report presents the business case for why Cummins Inc., a 10-billion-dollar diesel engine and power company, should adopt a sustainability strategy, and provides suggestions for how the company can incorporate the concept of sustainability into its existing processes. To explain how Cummins can integrate a sustainability strategy, we develop a sustainability vision statement for Cummins. We then draw upon the Four-Question Sustainability Framework to systematically analyze existing processes and suggest enhancements for how the company can become more sustainable. We recommend implementing these changes through four main channels: overall company objectives, planning processes, operational practices, and financial analyses.
- Thesis:** **Life-Cycle Optimization of Residential Clothes Washer Replacement**
Student(s): *Richard Bole '06*
Overview: The purpose of this study is to quantify this trade-off and determine optimal replacement intervals for residential clothes washers. The Life-Cycle Optimization (LCO) model employed to answer this fundamental research question uses as inputs separate Life-Cycle Inventory (LCI) and Life-Cycle Cost (LCC) profiles for each model year clothes washer from 1985-2020. These profiles represent four life-cycle phases of a washer: Material production, manufacturing and assembly, use, and end-of life management. The results of the LCI and LCC studies showed that the use phase of the washer's life cycle accounts for 96-99% of energy, carbon dioxide emissions and water use, but just 61%-86% of total costs over an anticipated 20 year life. From an energy or carbon dioxide emissions perspective, any average washer, regardless of model year, should be replaced with a new horizontal-axis washer in 2006, 2011 and 2016. From a water use and cost minimization perspective an average washer should be immediately replaced with a horizontal-axis washer which should be held until the end of the study period.
- Project:** **An Economic Analysis of the DTE Energy Hydrogen Technology Park**
Student(s): *Ed Chao '06, Marshall Chase '06, Kriss Jadd '07*
Overview: Hydrogen has received great attention in recent years as an energy storage and transmission medium, given its potential environmental, national energy security, and performance benefits. DTE Energy and the United States Department of Energy have established the Hydrogen Technology Park ("Park") in Southfield, Michigan, a technology validation program consisting of an operating, demonstration facility with hydrogen electrolyzers, compressed hydrogen storage, dispenser, and fuel cells. An engineering-economic analysis developed in this study, based on Park operating data and costs, estimates the current levelized cost of hydrogen ranging from \$12.33 to \$21.32/kg H₂ (for hypothetical Park-like facilities with output of 1,200 and 100 kg H₂/day, respectively), which is significantly higher than estimates made by other studies. Combining a fuel cell array with a neighborhood hydrogen filling station would result in an estimated current levelized cost of fuel cell electricity ranging from \$2.09 to \$2.13/kWh (for power generation of 5,000 kWh/day). The study concludes that the Park, with its current demonstration-stage technologies and costs, is not cost competitive in commercial hydrogen, utility-scale energy storage, or hydrogen vehicle markets.



- Thesis: **Some Benefits of Nearby Nature for Hospital Visitors: Restorative Walks in Nichols Arboretum**
- Student: *Katy Levine '06*
- Overview: The natural environment has restorative and stress reducing benefits. This study analyzes the use of nearby nature by hospital visitors, a group of people who are typically at risk for stress and mental fatigue. Study participants were visitors of the University of Michigan Hospital System (UMHS) who were residing at the Ann Arbor Ronald McDonald House (RMH), a residence for family members of hospitalized children. The study involved suggested walking routes in Nichols Arboretum (Arb) and a series of before and post walk survey instruments to measure mental fatigue and stress. In addition, a survey instrument to measure awareness and perception of the Arb was administered. The results of this study indicate that walking in nature is restorative and stress reducing for hospital visitors. In addition, these results indicate that there is a need to better inform hospital visitors about nearby nature. The results also suggest that longer-term visitors may take more walks in nearby nature and that walk materials, such as short defined routes and guidelines, may be particularly useful for hospital visitors. It should be noted that the results of this study are based on a small sample size. Additional research should be conducted to provide greater statistical evidence. This paper concludes by recommending methods to increase hospital visitor awareness of nearby nature and ways to enhance hospital visitors' experiences in nearby nature.



APPENDIX E: Erb Institute Faculty Leadership Team (FY2007)

Thomas P. Lyon, Director

Tom holds the Dow Chair of Sustainable Science, Technology and Commerce at the University of Michigan, a joint-appointment between the School of Natural Resources and Environment and the Stephen M. Ross School of Business. Professor Lyon earned his bachelor's degree at Princeton University and his doctorate at Stanford University. Prior to joining the Michigan faculty, he was a professor of Business Economics and Public Policy at the Kelley School of Business, Indiana University. He has been a visiting professor at the University of Chicago and at the University of Bonn, and a Fulbright Scholar at the Scuola Sant'Anna in Pisa, Italy. He spent the academic year 2002/2003 as a Gilbert White Fellow at Resources for the Future in Washington, DC, and 2003/2004 as a visiting economist in the Antitrust Division of the U.S. Department of Justice. Professor Lyon serves on the editorial board of the Journal of Regulatory Economics, and his research has been published in such journals as the RAND Journal of Economics, the Journal of Law and Economics, the Journal of Public Economics, the Journal of Economics and Management Strategy, and the Journal of Law, Economics and Organization. Professor Lyon's primary research interest is the interplay between corporate strategy and public policy, which he has pursued in a number of application areas, including corporate environmentalism, electric utility investment practices, natural gas contracting, innovation in the health care sector, and the introduction of competition in regulated industries. His book Corporate Environmentalism and Public Policy is forthcoming from Cambridge University Press in October 2004. Professor Lyon's teaching experience includes managerial economics, business and government, game theory, business strategy, and the management of innovation.

Thomas N. Gladwin, Associate Director

Tom holds the Max McGraw Professorship of Sustainable Enterprise, a joint-appointment between the School of Natural Resources and Environment and the Stephen M. Ross School of Business. Tom received a B.S. with Honors and Distinction from the University of Delaware in 1970 and a M.B.A. with Distinction from the University of Michigan in 1971. As the first Tenneco National Scholar in Industrial Ecology, he received a Ph.D. in International Business and Natural Resource Policy from the University of Michigan in 1975. He is the recipient of 24 foundation and academic awards for research on ecologically and socially sustainable commerce, including major awards from the National Science Foundation and the Energy Foundation. Tom is the author of over 130 articles, cases and chapters on international and environmental management and eight books. He serves on the Board of Directors of Trillium Asset Management Corporation, Sustainable Energy Institute, SustainAbility Ltd., and The Southeast Michigan Sustainable Business Forum. He was the John M. Olin Foundation Distinguished Visiting Fellow at Oxford University during 1994 and is currently an AT&T Industrial Ecology Faculty Fellow. He serves as a Core Faculty Member in the HRH The Prince of Wales's Business & The Environment Programme and is the Faculty Director of its Senior Executives' Seminar in the U.S. In 2003, Tom received the prestigious Faculty Pioneer Lifetime Achievement Award from the World Resources Institute and Aspen Institute.

Andrew J. Hoffman, Associate Director

Andy holds the Holcim (US) Professorship of Sustainable Enterprise, a joint-appointment between the School of Natural Resources and Environment and the Stephen M. Ross School of Business. Andy's research deals with the nature and dynamics of change within institutional and cultural systems. He applies that research towards understanding the cultural and managerial implications of environmental protection for industry. He has published over thirty articles and four books, including: Organizations, Policy and the Natural Environment, Competitive Environmental Strategy, From Heresy to Dogma: An Institutional History of Corporate Environmentalism, and Global Climate Change. He was awarded the 1995 Klegerman Award for Environmental Excellence at MIT, the 1995/97 environmental council post-doctoral fellowship at Northwestern University, the 1997 Broderick Prize for Excellence in Research at Boston University, and the 2003 Faculty Pioneer Rising Star Award from the World Resources Institute and Aspen Institute. Andy has a joint Ph.D. in management and civil & environmental engineering (and M.S.) from the Massachusetts Institute of Technology and a B. S. in chemical engineering from the University of Massachusetts. Prior to academics, he worked for the US Environmental Protection Agency, the Amoco Corporation, Metcalf & Eddy, and T&T Construction and Design.



APPENDIX F: External Advisory Board Members

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International Labor Rights Fund

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Corporate Governance
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Shepherd Advisors

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Global Forest Partners

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Environmental Affairs Manager
Herman Miller, Inc.

Mr. Scott Noesen
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Dow Chemical Company

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Mr. Ryan Waddington
Director, Entrepreneurial Programs
NextEnergy

Mr. Thomas Woiwode
Director, GreenWays Initiative
Community Foundation SE Mich.

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Mr. John Erb

Mr. Stuart and Mrs. Jo Ann Nathan