

U.S.

FORUMS

UNITED STATES INSTITUTIONS FOR FORUM

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General			
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<i>Type of Institution</i>	Academic, Research, Industry, NOG	Academic, Research, Industry	Historic Hotel now Campus
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<i>Location</i>	San Francisco	California	Virginia



THE Louis Berger Group, INC.

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<i>Location</i>	Washington, DC

BUSINESS FOR SOCIAL RESPONSIBILITY (BSR)

San Francisco, California, USA

ABOUT THE BUSINESS FOR SOCIAL RESPONSIBILITY

Founded in 1992, Business for Social Responsibility (BSR) is a US-based global resource for companies seeking to sustain their commercial success in ways that demonstrate respect for ethical values, people, communities and the environment. Through socially responsible business policies and practices, companies create value for investors, customers, employees, local communities and other stakeholders. BSR assists its members in creating that value by providing expert help as companies address the full range of corporate responsibility issues.

Why do companies join BSR? Balancing the interests of all stakeholders - investors, customers, employees, business partners, local communities, our global society and future generations - results in better informed business decisions, builds loyalty, enhances corporate and brand reputation and contributes measurably to long term profitability. BSR's member companies recognize that responsible business policies and practices are an important commercial imperative and that leadership companies make such behaviors a competitive business advantage.

ORGANIZATION STRUCTURE

BSR's member companies enjoy access to practical information, research, education and training programs, and technical assistance on all aspects of corporate social responsibility. In addition, BSR creates opportunities for business leaders to collaborate and network with their peers and other innovative managers from every business functional area representing companies of all sizes and sectors. BSR offers ongoing programs and projects in a dozen US cities, and provides valuable products and services outside the United States, both directly and in collaboration with a network of allied organizations around the world.

Members at an annual dues level of \$4,000 or more may contract with BSR for consulting services tailored to address particular issues, needs or opportunities. A portion of the member company's dues can be used for such projects. Additional work is performed for members on a discounted fee basis.

BSR is open to companies of all sizes and sectors, and we welcome "leadership" and "learning" companies. Today, more than 1,400 companies are members of or affiliated with BSR. Collectively, these firms employ more than six million workers and enjoy total annual revenues of more than \$1.5 trillion.

Member companies, representing nearly every sector of the global economy, include:

- American Express
- AT&T
- BP American
- British Telecom
- Bristol-Myers Squibb
- Dayton Hudson
- DuPont,
- Ford
- Fannie Mae
- General Motors
- Honeywell
- Home Depot
- Johnson & Johnson
- Levi Strauss
- Mattel
- Motorola
- Merrill Lynch
- Polaroid
- SAS Institute
- Starbucks
- Time Warner
- Universal Studios
- Wal-Mart
- Walt Disney

Smaller companies that have won recognition for innovative initiatives, such as Bright Horizons, Fel-Pro, Fetzer Vineyards, Patagonia, Tom's of Maine, and Stonyfield Farm Yogurt, account for a significant share of BSR's membership.

BSR's sister organization, the BSR Education Fund (BSREF), is a non-profit charitable organization serving the broader business community and the general public through research and educational programs about responsible business practices. BSREF's Global Business Responsibility Resource Center is the premier information resource about traditional and emerging areas of corporate social responsibility. BSREF's current programs include: Business and the Environment, Business and Human Rights, Community Economic Development, and Governance and Accountability.

The combined FY'99 budget for BSR and the BSR Education Fund is \$6 million. Twenty percent of BSR's revenues come from member company dues, and the remainder is comprised of voluntary contributions from member corporations, fees for products and services, and grants from corporate and private foundations, as well as support from the US Agency for International Development and the US Environmental Protection Agency.

EXPERIENCE

BSR offers products and services that address the full range of corporate social responsibility issues, including audits & accountability, community economic development, community involvement, the environment, ethics, governance, human rights, the marketplace, and the workplace.

BSR has a climate change program and has worked with over 150 companies on energy efficiency strategies. BSR is currently partnering with the World Resources Institute on a Green Power Market Development Group. The goal of this project is bring together major industrial companies that have significant purchasing power to pull the demand (and hence generation) of additional green power generation through the supply chain. Eleven major corporations responsible for over 4% (in aggregation) of the total US commercial energy use are participating in the project

FACILITIES AVAILABLE (BOTH TECHNICAL/INFRASTRUCTURE)

See Attached form on BSR's conference facilities

RESEARCH WORK

BSR's Climate Program offers several options for companies seeking to reducing or mitigate greenhouse gas emissions and reduce global climate change. Through the Climate Wise Initiative, BATE works with the US Department of Energy and the US Environmental Protection Agency to help 150 businesses implement cost-effective and productivity-enhancing measures to reduce the use of energy and other natural resources, minimize waste, and prevent pollution. Recent efforts include development of regional partnerships that offer peer exchange and support, as well as education and training opportunities. In the coming year, BATE will work with Climate Wise participants and a software company to develop a tool to measure a company's "climate footprint." The Climate Program also helps firms invest in projects that offset greenhouse gas emissions, and is launching a Green Power Project to help companies purchase power produced by renewable resources and invest in cost-effective renewable energy projects at their own facilities

REGIONAL AND INTERNATIONAL NETWORKS

BSR members have organized informal networks in in Arizona, California, Colorado, Massachusetts, Minnesota, New Hampshire, New York, Oregon, Pennsylvania and

Washington, D.C. Networks offer member companies access to educational programs, community service, and informal networking opportunities.

BSR conducts research and training activities and provides assistance to firms in addressing their global operations. BSR has conducted training and workshops in the US, Europe, Asia and Latin America. BSR also is part of a growing global network of business membership organizations focusing on corporate social responsibility. With these groups, BSR is expanding its capacity to serve members' global needs.

Business for Social Responsibility is part of a growing global network of business membership organizations that focus on corporate social responsibility. Working in partnership with these groups, BSR is expanding its capacity to serve its members' global business needs and to achieve the mission of the BSR Education Fund.

BSR has established:

- Formal partnerships with Ethos Institute (Brazil), MAALA (Israel), Business in the Community (UK), Generación Empresarial (Chile) and "Empresa Privada para la Responsabilidad Social Empresarial" (Panamá)
- Additional links to other business organizations with similar interests in the US, Canada, Europe, Latin America, Asia and Africa.

BSR is also a founding member of EMPRESA, the Forum on Business and Social Responsibility in the Americas. EMPRESA is a new coalition of business organizations whose mission is to strengthen and establish national and regional business organizations committed to social responsibility in Latin America by promoting information exchange, collaboration, education, networking and partnerships among these groups, their members and other sectors.

KEY PERSONNEL

- **Katherine O'Dea**, Director of the Business for Social Responsibility Education Fund (BSREF) Business and Environment Program (BATE) since September 1998 and is the principal architect of the Sustainable Commerce Program. Ms O'Dea has primary responsibility and accountability for the design and development of environment/sustainability projects, products and services and the management of program revenue generation and allocation. Additionally, she leads consulting projects for a number of BSR member companies, among them currently Bristol Meyers Squibb, McDonald's, General Motors, Dow, Dell and Nike. Prior to joining BSR, Ms O'Dea was the Executive Director and CEO for the International Society of Logistics (ILS), a 10,000 member professional association with an operating budget of 1.6 million.

At ILS she pioneers an innovative approach to corporate environmental management, i.e, the application of logistics engineering tools and logistics

support planning methodologies to pollution prevention, eco-efficiency and sustainability initiatives. Ms O'Dea has over 9 years experience working as an environmental and total quality management consultant and trainer/facilitator for various government agencies and a diverse set of industries including ABB, Raytheon, Indigo Development, Nortel, Pratt and Whitney and 3M. Key areas of expertise include: pollution prevention, design for environment, environmental management systems, total cost accounting, extended product responsibility, eco-efficiency and industrial ecology.

- **Joanna Bullock**, Manager of the Business for Social Responsibility Education Fund (BSREF) Business and Environment Program (BATE) and leads the Climate program. The Climate Program helps businesss' reduce and offset greenhouse gas emissions through focus on internal efficiency, green power, carbon off-sets, and clean transportation. Ms. Bullock works in partnership with business, government, and non-government organizations to develop pilot projects designed to reduce global warming. She assists USEPA develop strategy and policy for the Climate Wise program and works directly with companies such as General Motors, Nike, Patagonia, and Oracle helping them identify and implement carbon emissions reduction programs. She helps develop regional networks of companies such as the New Jersey Climate Wise Partnership that add value to business and the broader community of stakeholder through peer exchange, recognition of best practices, and collaboration.

Ms. Bullock has 20 years of environmental experience in the public and private sectors. She was a facilities siting manager and state and local liaison for AT&T's Engineering Division in Northern California. She managed a host of projects ranging from transportation to hydro and nuclear energy projects for state agencies such as the California Public Utilities Commission, the California Air Resources Board and the California Environmental Protection Agency. These projects include preparation of environmental impact reports, rule and policy revision, permitting and siting new facilities, and hazardous was site remediation. She assisted with the environmental assessment and policy development for electric deregulation in California. Ms. Bullock received a Bachelor of Science in Environmental Economics and Policy from the University of California, Berkeley and a Master of Science in Environmental Management from the University of San Francisco.

- **David Monsma**, Senior Program Manager in the Business for Social Responsibility Enterprise/Commerce Program. He is an attorney and a member of the Connecticut State Bar with over 10 years experience in environmental law and policy. Prior to joining BSR, Monsma coordinated the Environmental Management Task Force for the Presidents council for Sustainable Development and was the principal author of chapter 3 in the 2999 PCSD report, Towards Sustainable America. He recently co-authored a two-part article on performance-based environmental management for the Journal of Corporate Environmental

Strategies and just completed an article on sustainable development and global environmental management for the Vermont Law Review.

While at the PCSD, Monsma worked directly with the White House Council Environmental Quality and the National Partnership for Reinventing Government in the Office of the Vice-President on the development of the EPA's new National Environmental Performance Track Program. He has participated in many of the major environmental regulatory and management reform dialogues, including the Aspen Institutes Series on the Environment, Enterprise for the Environment, U.S. EPA's Common Sense Initiative and Project XL. Previously, Mr. Monsma directed Campaign for Cleaner Corporations at the Council on Economic Priorities in New York and served as staff counsel and directed the Pollution Prevention program for Environmental Action Foundation in Washington D.C. Monsma received a B.A. in Psychology from the University of Colorado and his JD from the University of Baltimore.

- **Marya Glass**, Program Associate in the Business for Social Responsibility Education Fund (BSREF) Business and Environment Program (BATE). Ms. Glass is co-managing the program's Green Power Market development Group, as well as co-managing the development of the environment track conference sessions for BSR's annual conference. This year's conference includes a roundtable discussion of genetically modified organisms in the supply chain. Ms. Glass holds a B.A. in environmental studies and planning, and a graduate certificate in journalism.

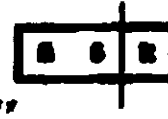
REVIEW MECHANISM

BSR strives to inform members on a limited number of national public policy issues about which they have expressed a special interest. BSR does not take positions on public policy issues, nor does it endorse or oppose specific legislation, referenda or candidates.

POTENTIAL RESEARCH FORUM TOPICS

The following topic areas would be of particular interest to BSR in conducting /co-hosting a research forum for the USAID/India-Greenhouse Gas Pollution Prevention Project:

- Climate Impact "Foot printing"
- Energy eco-efficiency
- Green power purchasing and/ or on-site generation
- Carbon offsets



Business for Social Responsibility
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July 28, 2008

Erik Rugh
US Program manager
USAID/India - Greenhouse Gas Pollution Prevention Project
The Louis Berger Group, Inc.
1819 h Street, NW, Suite 900
Washington, DC 20006


Dear Erik,

Thank you for considering the Business for Social Responsibility Education Fund (BSREF) as a potential collaborator in co-hosting a Greenhouse Gas Pollution Prevention Project Research Forum focused on climate change impacts in India. In principle, BSREF is pleased to confirm our interest and accept the opportunity.

We look forward to discussing research topics with you to identify where our organization can add the most value to the project and support for the related activities. As you know, we have over 6 years experience working directly with companies and business organizations on climate change issues. We have facilitated over 100 global companies undertake their climate impact, identify best opportunities to reduce that impact and design, develop and implement innovative eco-efficiency initiatives that have resulted in the reduction of several billion tons of CO₂ and other greenhouse gases.

We understand that the terms and conditions for conducting the research and publishing any resulting reports or papers will be negotiated prior to reaching final agreements and scheduling the forum. We would anticipate mutually signing an appropriate memorandum of understanding (MOU) once terms and conditions have been agreed upon.

Again, thank you for considering BSREF. We look forward to having the opportunity to work with you on the USAID/India - Greenhouse Gas pollution Prevention Project. Please do not hesitate to contact me by phone at 41 537 0890 x142 or e-mail katharine@bsr.org to discuss next steps when appropriate.

Sincerely,

Katherine O'Dea, Director
Sustainable Commerce Program
Business for Social Responsibility Education Fund

News Monitor

or Social Responsibility

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GENERAL CORPORATE SOCIAL RESPONSIBILITY

MCDONALDS-VANDALIZING "RADICAL" FRENCH FARM GROUP GAINS GLOBAL VISIBILITY

Reports on the trial of French farmer Jose Bove – and other members of his anti-GMO, anti-fast food, anti-globalization farmers' organization Confederation Paysan – for allegedly "dismantling" a McDonalds in France in 1999. Notes that Bove and his colleagues have turned a minor vandalism charge into a cause celebre that has drawn world attention. Mentions that Bove was a prominent figure in last year's World Trade Organization protests in Seattle. Also notes that Bove's group is responsible for destroying a stock of genetically modified corn seeds owned by Swiss firm Novartis, and that the ensuing trial proved embarrassing for Novartis. Points to a "low key" stance on the part of McDonalds, which affirms that its restaurants are an important market for French farmers and are popular with the French public.

– *Financial Times*, June 30, 2000, p. 3

BUSINESS ETHICS

ETHICS MATTER TO EMPLOYEES

Reports on a Hudson Institute national study measuring employees' perceptions about their organization's ethical environment. Reports that the survey of 2,293 workers from every sector of the U.S. economy indicates a positive correlation between high ethical standards, work commitment, and loyalty to the employer. Summarizes a survey result: "Employees who believe they work in an ethical environment are six times more likely to be loyal than workers who believe their organization is unethical."

– *Association Management*, June 2000, p. 70

Competitive Intelligence

ORACLE ACKNOWLEDGES SPYING ON MICROSOFT

Discusses the recent controversy over the Oracle Corporation's acknowledgement that it hired a detective agency to investigate ties between Microsoft and three advocacy groups. Adds the detective firm apparently used controversial practices such as "dumpster diving." Quotes the company's chairman and founder, Lawrence J. Ellison, as saying "All we did was to try to take information that was hidden and bring it into the light. I don't think that's arrogance. That's a public service." Adds that Mr. Ellison asserts that in light of Microsoft's business practices and recent antitrust case, his company's actions were justified. Mentions that Microsoft issued a statement denouncing its competitor's actions – and Mr. Ellison's involvement and knowledge of the situation – and noting that Oracle had also financed lobbying groups which have taken stands against Microsoft.

– *New York Times*, June 29, 2000, p. C8

Corruption and Bribery

WEAPONS MANUFACTURERS IN EUROPE FILL OFFSHORE SLUSH FUNDS FOR BRIBERY PURPOSES

Reports that some major European weapons manufacturers are creating offshore funds in an effort to side-step new anti-bribery laws soon to be enacted by OECD members. Quotes the chairman of the OECD working group on corruption as saying, "Many companies are building slush funds because they

want to retain the option to bribe." Notes the arms industry has a lengthy history of paying "commissions" when bidding on contracts, and adds that this sector is likely to have more difficulty than most in complying with the new OECD convention. Also notes the OECD has criticized Britain for moving slowly to pass implementing legislation and Japan for passing legislation considered to be inadequate.

-- *Financial Times*, June 29, 2000, p. 3

BRIBERY INFLUENCES \$165 BILLION IN INTERNATIONAL BUSINESS CONTRACTS

Cites a new U.S. Department of Commerce report which found that bribery had "affected" approximately \$165 billion in international business contracts during the last six years. Quotes U.S. Commerce Secretary William Daley as saying this sum represents 353 contracts identified as being influenced by bribery, and that U.S. companies had lost 92 of these for a total of \$26 billion.

-- *Financial Times*, June 30, 2000, p. 4

COMMUNITY ECONOMIC DEVELOPMENT

Micro Finance in Emerging Economies

ENTREPRENEURIAL SUCCESS FROM MICRO-LENDING TO NEW YORK'S POOR

Describes two New York City-based organizations sponsored by Cornell University that promote business development among low-income individuals, particularly those on public assistance. Mentions *Cooking Up Business*, which offers two years of free business training, and the *Trickle Up Program*, which awards \$700 grants to aspiring businesspeople to help them buy machinery or equipment. Profiles the success of a formerly indigent woman who now has a comfortable apartment and small business.

-- *Crain's New York Business*, June 12-18, p. 40

Minority and Women Business Development

VENTURE CAPITAL FORUM SHOWCASES WOMEN ENTREPRENEURS

Describes Springboard 2000, a conference held by the National Women's Business Council at which 26 female CEOs presented their ideas and companies to 300 potential investors. Explains that only 5 percent of U.S. companies receiving venture funding are run by women. Notes that Springboard 2000 was created for two reasons: to develop a formal way for potential investors to meet deserving female entrepreneurs, and to build a lasting network of successful women who can help future generations.

-- *Working Woman*, July/August 2000, p. 73

Product and Service Delivery in Underserved Communities

TELECOM COMPANIES EXPAND SERVICES IN HARLEM

Reports that Sprint and other telecommunications companies are expanding their wireless services into Harlem and other underserved neighborhoods in the New York City area. Quotes a Sprint official who noted that customers from Harlem were traveling out of the area for wireless services, so the company "followed the market back to the source." Also reports on efforts by other telecom companies to market to Hispanic, Asian, and African-American customers, and mentions the number of new Hispanic cell phone subscribers is up 34 percent from 1999.

-- *Crain's New York Business*, June 19, 2000, p. 24

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UNIVISION.COM SEEKS TO BRIDGE DIGITAL DIVIDE

Reports that Los Angeles-based Spanish-language television network Univision Communications Inc. has launched an Internet venture, and pledged to incorporate technology education for low-income Latinos into its on-air promotions for the site and other computer related products. Asserts this publicity will reach millions of Latino immigrants and help bridge the so-called "digital divide." Notes that IBM and software manufacturers are partnering with Univision.com to provide a PC and ISP package loaded with the Univision homepage and a Spanish-language telephone assistance number.

– *San Jose Mercury News, June 29, 2000, p. 2C*

Recruitment and Retention of Underutilized Workers

DIVERSE GATHERING CONSIDERS HOW TO MOVE LOW-WAGE WORKERS INTO LIVABLE JOBS

Reports on "Low-Wage Workers in the New Economy: Strategies for Opportunity and Advancement," a national policy summit held this in May in Washington D.C., which examined how people new to the workforce could move out of poverty by advancing into better jobs. Notes the conference was sponsored by a unique assortment of nonprofits, labor groups, government bodies, and the manufacturing industry, including Jobs for the Future, the AFL-CIO, the National Association of Manufacturers, the National Governors' Association, National League of Cities, National Urban League, The Urban Institute, and the Welfare to Work Partnership. Adds that a task force of 300 attendees identified these obstacles to recruiting, hiring, and training low-wage workers: "lack of transportation or suitable housing; child care that may be inadequate, unaffordable or both; and lack of suitable identification or improper immigration documentation." Suggests that employers seeking to help workers make the jump from poverty must help them address personal, financial, or familial challenges such as mental, physical and emotional disabilities, language barriers, and developing a work/life balance.

– *HR News, July 2000, p. 8*

COMMUNITY INVOLVEMENT

Global Community Involvement

LUCENT TECHNOLOGIES ADVANCES DISTANCE LEARNING EFFORTS IN LATIN AMERICA

Discusses Lucent Technologies' recent grant to Partnership in Global Learning, a collaborative effort between Bell Labs and U.S., Mexican, and Brazilian universities. Reports the goal of the \$1.5 million, three-year program is to distribute learning globally using technologically enhanced distance learning methods. Notes the universities will "adopt" primary and secondary schools located in their areas and work with teachers in those schools. Adds that after the initial phase is completed in Latin America, universities in Asia, Europe, Africa, and the Pacific Rim will be able to join the program.

– *Corporate Giving Watch, May 2000, p. 3*

DUKE ENERGY FOCUSES ON GLOBAL VOLUNTARY SERVICE

Highlights the efforts and progress of Charlotte, North Carolina-based Duke Energy's global corporate volunteer program. Describes the annual month-long initiative in which more than 5,700 employees, retirees, and family members engage in 100 service projects in 70 communities around the globe. Outlines the strategic planning approach taken by the company in organizing its volunteerism program and its grantmaking. Further information is available at: <http://www.duke-energy.com>.

– *Pro Bono, May 2000, p. 6*

Philanthropy

WAL-MART/SAM'S CLUB FOUNDATION SETS NEW GIVING RECORD

Highlights the charitable contributions program operated by the Wal-Mart/SAM's Club Foundation, which includes corporate gifts and donations made by employees and customers at Wal-Mart and SAM's Club stores throughout the United States. Notes the foundation has grown from giving \$200,000 in 1979 to giving more than \$163 million in 1999. Further information is available at:

<http://www.walmartfoundation.org>.

– *Corporate Giving Watch*, May 2000, p. 1

SENIOR BRITISH MANAGERS SPEND ALMOST ONE DAY A MONTH VOLUNTEERING

Reports on a new study by Deloitte and Touche and the Charities Aid Foundation which shows that the typical senior level British executive spends seven hours a month volunteering for charitable purposes. Adds that chairmen were twice as likely as directors to engage in volunteerism. Notes that volunteer time for senior executives most often takes the form of serving on committees, rather than more "hands-on delivery functions." Adds that while slightly more than half of senior British managers see a link between personal charitable contributions and their company's "broader corporate social responsibility," only 20 percent feel charitable activities are expected of their companies.

– *Financial Times*, July 3, 2000, p. 7

ENVIRONMENT

"Forest Friendly" Practices

BATTLE GIVES WAY TO NEGOTIATIONS OVER THE FATE OF FORESTS IN BRITISH COLUMBIA

Reports that the long-running conflict between environmentalists and logging companies over the fate of forests in British Columbia, Canada is giving way to more productive negotiations. Notes the two sides are discussing how companies can achieve environmental certification for their timber, which is becoming a competitive advantage in the marketplace. Adds that Greenpeace and other groups have convinced international furniture and lumber retailers including Home Depot to favor certified wood products. Also points to the decision by forestry group MacMillan Bloedel (subsequently taken over by Weyerhaeuser) to phase out clear cutting. Adds that disagreement remains over whether to adopt the certification standards put forth by the Canadian Standards Association, or those of the more environmentally strict Forest Stewardship Council.

– *Financial Times*, June 29, 2000, p. 17

Green Building Design

SEATTLE COMMITS TO GREEN BUILDING DESIGNS

Notes that the city of Seattle has announced all public buildings larger than 5,000 square feet will be consistent with the silver rating of the U.S. Green Building Council's Leadership in the Energy and Environmental Design (LEED) Green Building Rating System. Mentions the city's plans to build a city hall, justice center, and central plaza at a cost of \$222 million. Further information on the Seattle plan is available at <http://www.ci.seattle.wa.us/util/recons/susbuild/plan.html>, and more information on LEED standards can be found at <http://www.usgbc.org>.

– *Pollution Prevention Northwest*, Spring 2000, p. 7

Sustainable Business Practices

UN OPENS CONSERVATION CENTER FUNDED IN PART BY EXTRACTIVE AND TOURIST INDUSTRIES

Discusses a new United Nations "World Conservation Monitoring Centre" in Cambridge, England which obtains about 14 percent of its funding from oil, mining, and tourism companies. Asserts companies in these industries realize they "are at risk of having a major environmental impact," and know they need to monitor their activities more closely. Notes that Rio Tinto obtains information from the Center on endangered species and protected areas, and that it withdrew from a nearly completed joint venture when it found out the Center had identified the prospective area as a world heritage site. Adds that companies including Rio Tinto and BP Amoco not only draw on the Center's resources but provide it information as well.

– *Financial Times*, July 3, 2000, p. 7

NEW REPORT SUGGESTS GREENHOUSE PACTS WILL HURT MINORITIES

States that a new report commissioned by six organizations representing minority groups and paid for by the coal industry asserts that Hispanic and African Americans will suffer disproportionately if the United States adopts a UN treaty to reduce greenhouse gases. Includes statistics suggesting the treaty would diminish the earnings of 25 million African American and Hispanic workers by 10 percent, and eliminate the jobs of 864,000 African Americans and 511,000 Hispanics. Cites an environmental activist as stating the six organizations have "sold out to big business." Explains that "minority groups contend that companies will offset the cost of meeting emissions standards by reducing salaries and benefits on positions primarily held by minorities and by moving factories to countries not bound by the same environmental standards."

– *Washington Post*, July 6, 2000, p. A04

CHEMICAL INDUSTRY ATTEMPTS TO IMPROVE POOR ENVIRONMENTAL REPUTATION

Reports that senior American chemical firm managers are attempting to clean up their industry's poor reputation, which ranks above only the tobacco and nuclear power industries in the United States. Cites figures showing that chemical emissions were reduced by 58 percent in the United States between 1988 and 1997 while production rose by nearly 20 percent. Adds the industry's goal is to convince employees, communities located near chemical plants, legislators, and scientists that major improvements have been made. Points to large sums of money spent by the industry researching how chemicals affect human health and the environment, and cites a \$100 million Long Range Research Initiative aimed at hazard-testing the impacts of 1000 high volume chemicals.

– *Financial Times*, July 3, 2000, Special Section p. 11

POLLUTION PREVENTION PREDICTIONS

Speculates on pollution prevention innovations in the year 2050, and suggests these examples: "sensor net" that will prevent pollution in real time by monitoring and changing building conditions and industrial processes; "smart plants" that produce biologically-based materials that will serve as alternatives to plastics and other petroleum-derived chemicals; and "distributed utilities" located in factories, stores, schools, hospitals, and home basements that will be smaller, cleaner, and more energy-efficient. Also mentions possible risks involved with these innovations such as a "big brother" infringement on privacy from the sensor net, the anti-genetically-modified-organism sentiment against smart plants, or the possibility that decentralized utilities will produce more pollution or technical problems.

– *Pollution Prevention Northwest*, Spring 2000, p. 1

GOVERNANCE

Shareholder Engagement

EUROPEAN FIRMS PRESSURED TO PRODUCE MORE COMPREHENSIVE REPORTING TO SHAREHOLDERS

Special section on shareholder communication contends that a "metamorphosis" of traditional financial reporting is taking place in Europe as companies are pressured to acknowledge their impacts on communities, employees, and the environment. Adds that European investors are demanding that European firms adopt concepts of shareholder value and transparency. Predicts companies will begin producing a greater volume of detailed, relevant reporting that will help investors better understand a company's operations and prospects. Notes the argument of professional services' firms that current financial reporting fails to value a firm's "real assets such as people, know-how, and stakeholder relationships."

-- *Financial Times, June 30, 2000, Special Section*

HUMAN RIGHTS

STUDY SUGGESTS MULTINATIONALS DO NOT SEEK OUT COUNTRIES WITH LOW LABOR STANDARDS

Reports on a study by the Organization for Economic Co-operation and Development (OECD), which suggests that multinational companies do not seek out countries with low labor standards in order to cut operation costs. States that "with the significant exception of China, countries where core labour standards are not accepted continue to receive a very small share of global flows." Also states that multinationals seem to prefer doing business in countries that respect freedom of association.

-- *Financial Times, June 27, 2000, p. 8*

UN REPORT SAYS DEMOCRACY IS VITAL TO HUMAN DEVELOPMENT

Reports on this year's Human Development Report published by the United Nations Development Programme (UNDP), which states that democracy and fundamental freedoms are as essential to reducing poverty as economic growth and access to basic services. States that the report calls not only on governments but also on financial institutions and multinational corporations to promote human rights. Reports that Canada ranks first in the human development index, and that 22 countries in Africa and Eastern Europe have gone backward in human development since the annual report was launched in 1990.

-- *Financial Times, June 30, 2000, p. 7*

MARKETPLACE

COMPANIES SUE INTERNET USERS FOR ON-LINE COMMENTS

Discusses the growing number of so-called cybersmear cases filed by companies against individuals posting derogatory information on Internet message boards. Reports that at least 70 such cases have been filed in the last two years by companies alleging that libelous comments by Internet users have damaged company reputations and had a negative impact on stock prices. Adds that most cybersmear suits center on messages posted on financial websites, which many small investors use to make investment decisions. Notes that critics of the lawsuits say many are frivolous and designed to silence and to retaliate against people with whom the company does not agree. Mentions that E-Trade, Raytheon, Ross Stores, Sun Microsystems, and Yahoo have all filed cybersmear suits.

-- *San Francisco Chronicle, June 26, 2000, p. B1*

Ethical Marketing

PROVIDIAN AGREES TO SETTLE CASE CHARGING IT MISLED AND CHEATED CUSTOMERS

Reports that San Francisco, California-based credit card company Providian Financial has agreed to pay more than \$305 million to settle charges it engaged in deceptive practices that cheated customers. Notes that as part of the settlement, Providian agreed to make "a sweeping series of changes" in its direct mail and telemarketing sales techniques. Quotes the California Attorney General as saying the settlement is "one of the most significant consumer recoveries in the history of the United States." Mentions that Providian's CEO said the company does not admit any wrongdoing and settled the case because it "needed to lay this matter to rest."

— *San Francisco Chronicle*, June 29, 2000, p. B1

Genetically Modified Organisms

BRAZILIAN COURT BLOCKS MONSANTO DISTRIBUTION OF GENETICALLY MODIFIED SOYBEANS

Reports that a federal court in Brazil has prevented Monsanto from distributing its "GM Roundup Ready Soybean" until the company presents comprehensive environmental impact studies. Adds that the court has instructed the government to establish detailed regulations regarding the distribution of genetically modified organisms and their impact on human health. Notes that Greenpeace and Brazilian consumer advocate group IDEC have challenged Monsanto in court, and that the company will miss out on planned seed sales for the upcoming planting season.

— *Financial Times*, June 30, 2000, p. 24

Pricing, Billing and Contracting

GERMAN CARTEL OFFICE INVESTIGATES WAL-MART GROCERY PRICING

Reports that Wal-Mart Stores has denied accusations it has been selling some products at a loss in its German stores in an attempt to undercut rivals. Points out the company made the statement after Germany's cartel office opened a probe into its pricing. States the cartel office received a complaint that Wal-Mart was breaching competition rules, and notes the office was also investigating other retail grocery companies in Germany on similar charges. Cites a company statement that Wal-Mart had complied with requests for lists of wholesale and retail prices.

— *Wall Street Journal*, June 29, 2000, p. C19

Product Quality and Safety

NEW YORK STATE SUES GUN MAKERS

Reports that New York State has become the first state in the country to file suit against gunmakers, alleging the industry is partly responsible for the damage inflicted by gun violence. Mentions that while New York joins 32 cities and counties in the United States, its suit differs in that it is filed under a state public-nuisance law. Notes that several experts assert this tactic is legally stronger than the negligence claims of the local governments. Adds the gun manufacturers named in the suit include Beretta, Bryco, Colt, Glock, Intratec, Phoenix, Sturm Ruger, and Taurus.

— *New York Times*, June 26, 2000, p. A20

TRADE WINDS: JAPAN TO TEST GMO PRODUCTS

Reports that Japan will begin testing imports of genetically modified products, a move that could have "serious consequences" for U.S. and E.U. agriculture exporters. Japan receives approximately 80 percent of its soybean imports and 90 percent of its corn imports from the United States, totaling almost \$10 billion in agricultural products a year."

-- *World Trade, July 2000, p. 24*

WORKPLACE

STUDIES FIND CORRELATION BETWEEN TRUST, EMPLOYEE COMMITMENT, AND PROFITABILITY

Cites statistics linking employees' trust in their employers to commitment levels and company profitability. Reports that a survey of 1,800 U.S. workers by Aon's Loyalty Institute found that 13 percent distrust their employers on the "most basic level," meaning they do not feel free from fear, intimidation, or harassment at work. Adds that the Aon research found that without trust a company's benefits will not have a significant impact on employee commitment. Mentions findings from a Watson Wyatt Worldwide survey of 7,500 employees which found that only half of respondents trusted their senior managers, and that companies where employees trusted top executives posted shareholder returns 42 percent higher than companies where distrust was the norm.

-- *San Francisco Chronicle, July 2, 2000, p. CL29*

INCREASED EMPLOYEE INVOLVEMENT HIGHLIGHTED AT INTERNATIONAL HUMAN RESOURCES FORUM

Reports findings from a Manpower survey of HR professionals presented at the 8th Annual World Congress on Human Resources Management in Paris. Notes survey responses from seven countries -- France, Germany, Holland, Italy, Japan, the United Kingdom, and the United States -- pointed to an increase in employees' need for "expression." Quotes Manpower president and CEO Jeffrey Joerres as saying, "Employees want to be listened to. They want to have an expression and discussion up and down the organization. They want to have a better understanding of how they can contribute to the organization."

-- *HR News, July 2000, p. 1*

Compensation

SALARY SURVEY IDENTIFIES OLD PROBLEMS AND NEW HOPE FOR WOMEN'S COMPENSATION IN U.S.

Cites the results of Working Woman's Year 2000 Salary Survey, which shows that women are still being paid less than men in most careers. Notes, however, that women are closing the salary gap in application development and database analysis, and that women routinely out-earn men in the field of advertising. Also notes that in the fields of law, chemistry, and medicine, surveyed individuals were optimistic about the opportunities for women just beginning their careers, because entry-level women in law and chemistry are taking home the same salaries as their male counterparts.

-- *Working Woman, July/August 2000, p. 58*

AOL IN DISPUTE WITH EXTERNAL VOLUNTEERS

Reports on America Online's (AOL) legal dispute with a group of people who volunteer their services on the website to facilitate chat rooms, discussion areas, and other on-line services. Notes AOL has more than 14,000 unpaid volunteers, about 1,000 more than the number of employees on the payroll. Cites volunteer leaders who say the company has treated them poorly in its pursuit of profits, but quotes a company spokesperson as stating AOL has "enormous respect for the work and opinions of its volunteers."

-- *Washington Post, July 2, 2000, p. H01*

Contingent Workforce

MICROSOFT CHANGES TEMPORARY WORKER POLICY

Reports that Microsoft recently changed its temporary worker policy by limiting the amount of time such workers can work at the company to 12 months. Notes that workers could be eligible for re-employment after taking a mandatory 100-day break. Asserts the policy change was influenced by a federal lawsuit filed by longtime "temporary" employees, alleging the inappropriate use of temporary workers. Notes that the lawsuit, first filed in 1992, is expected to have lasting implications for employers and the estimated 10.2 million American workers employed in temporary or contract jobs. Mentions that labor advocates say Microsoft and others misuse the words "temporary" and "independent contractor" to take advantage of some workers. Notes that industry supporters say the staffing flexibility of a temporary work force has contributed to the growth of the high-tech sector.

– *Los Angeles Times*, July 1, 2000, p. C1

Recruitment/Hiring

CREATIVE TIPS FOR RECRUITING VALUABLE EMPLOYEES

Lists tips for recruitment and retention of employees, including: (1) holding an open house for potential recruits and their families, (2) targeting people who volunteer with nonprofit organizations, (3) holding management development workshops for employee advancement, and, (4) clearly identifying the company's core values.

– *Training & Development*, June 2000, p. 14

Workplace Culture

BEING NICE PAYS IN EMPLOYEE LOYALTY

Reports survey findings indicating that managers' people skills may be more important in retaining employees than a large retention benefits budget. Features a Lou Harris Associates survey that found that "59 percent of employees say their company does not genuinely care about them or their careers; 55 percent say they do not have strong loyalty to their company; and 40 percent of those who rated their bosses' performance as poor said they were likely to look for a new job." Further information is available at: <http://www.louharris.com>.

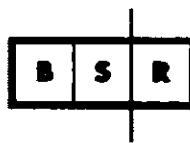
– *What's Working in Human Resources*, June 16, 2000, p. 3

ALASKA AIRLINES CITED FOR LOW STAFF MORALE

Reports the findings of an independent assessment team which concluded that Alaska Airlines management allowed staffing levels to deteriorate and failed to communicate adequately with workers, thereby causing employees to develop low levels of morale. Adds the team did not focus on the January 31, 2000 crash of Alaska Flight 261, but rather on practical ways to develop a better "safety culture" at the company. Mentions the company was cited for having superior training programs in place, and that company management plans to adopt every recommendation in the report.

– *Washington Post*, July 6, 2000, p. A02

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UPDATE

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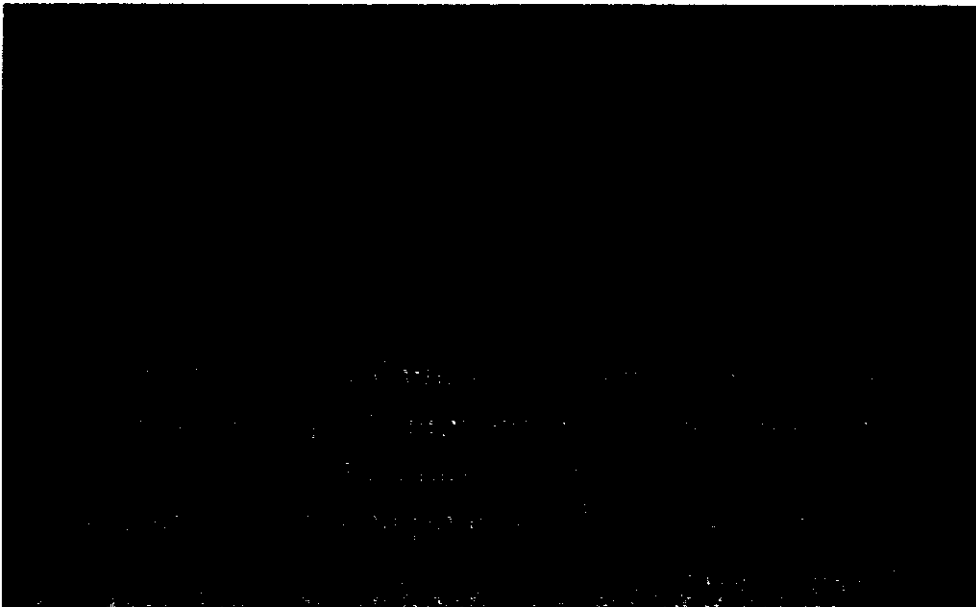
Mergers and Social Responsibility: Keys to Avoiding a CSR Culture Clash

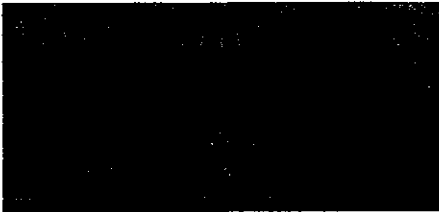
What happens when a business committed to corporate social responsibility joins forces with one that isn't? In an age of record-breaking mergers and acquisitions, a growing number of firms are addressing the challenges of keeping the CSR culture alive and well after two companies say, "I do."

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Cause-Related Marketing Guidelines

As strategic cause-related marketing (CRM) partnerships continue to grow, companies and nonprofits have expressed a need for guidance in developing mutually beneficial, educated, and ethical CRM partnerships. Through a grant from the Columbia Foundation the BSR Education Fund has adopted UK-based Business in the Community's CRM guidelines to help companies and nonprofits form successful marketing-related partnerships. The guidelines include sample leadership practice case studies providing real-world examples successful company-nonprofit partnerships.

- To receive a copy, contact Valerie Crissey at 415.537.0890, ext. 118, or vcrissey@bsr.org.

Happy New Year!

As the Y2K clock ticks ever louder, companies may wish to consult "Employee Y2K Personal Preparedness Program Facilitator's Guide," geared to helping businesses "inform, guide and prepare your employees, as well as their families and communities, for Y2K."

- BSR members can receive a free copy by contacting Esther Shafran at 415.537.0890, ext. 102.

BSR Holds Compliance Workshop in China

Join personnel from leading brands and numerous representatives from Chinese apparel and footwear factories from Shenzhen to Hong Kong

for BSR's compliance workshop in Guangzhou, China, November 15-16. The workshop will provide participants with a valuable opportunity to learn about effective ways to strengthen their compliance with codes of conduct and local legal requirements on issues including: worker health and safety; child labor; freedom of association; and wages, benefits, and working hours. The two-day workshop is designed for contractors and suppliers in China with both a basic and an advanced knowledge of codes of conduct and compliance efforts.

- For more information, contact Sridevi Kalavakolanu at 415.537-0890, or skalavakolanu@bsr.org.

New Toolkit on Domestic Violence and Work

A new toolkit entitled "The Workplace Responds to Domestic Violence: A Resource Guide for Employers, Unions and Advocates" has been published by the National Workplace Resource Center on Domestic Violence. It includes sections on creating a supportive environment, supervising an employee who is a victim of domestic violence, core human resource policies, employee and member assistance programs, security issues, and other topics.

- For more information, contact: Family Violence Prevention Fund, 383 Rhode Island St., Ste. 304, San Francisco, CA 94103; 415.252.8900.

BY THE NUMBERS: CONSUMER ACTIVISM AND CSR

The numbers below show how consumers in different regions have treated a company perceived as not socially responsible. The data come from the Millennium Poll on Corporate Social Responsibility conducted by Environics International, the Prince of Wales Business Leaders Forum, and the Conference Board, and released in October 1999. The results, based on more than 25,000 interviews in 23 countries on six continents, represent one of the most comprehensive studies ever conducted on consumer attitudes toward the private sector.

	Have Punished a Company	Have Considered Doing
North America	16%	16%
Europe	14%	16%
Asia	24%	18%
Latin America	12%	16%
Central Asia	16%	16%

Sustainable Measures: Evaluation and Reporting of Environmental and Social Performance, edited by Martin Bennett and Peter James, focuses on environmental and social performance measurement from around the world. The book examines current corporate practices in several countries as well as company case studies.

- The book is available from Greenleaf Publishing: +44.114.282.3475, or www.greenleaf-publishing.com.

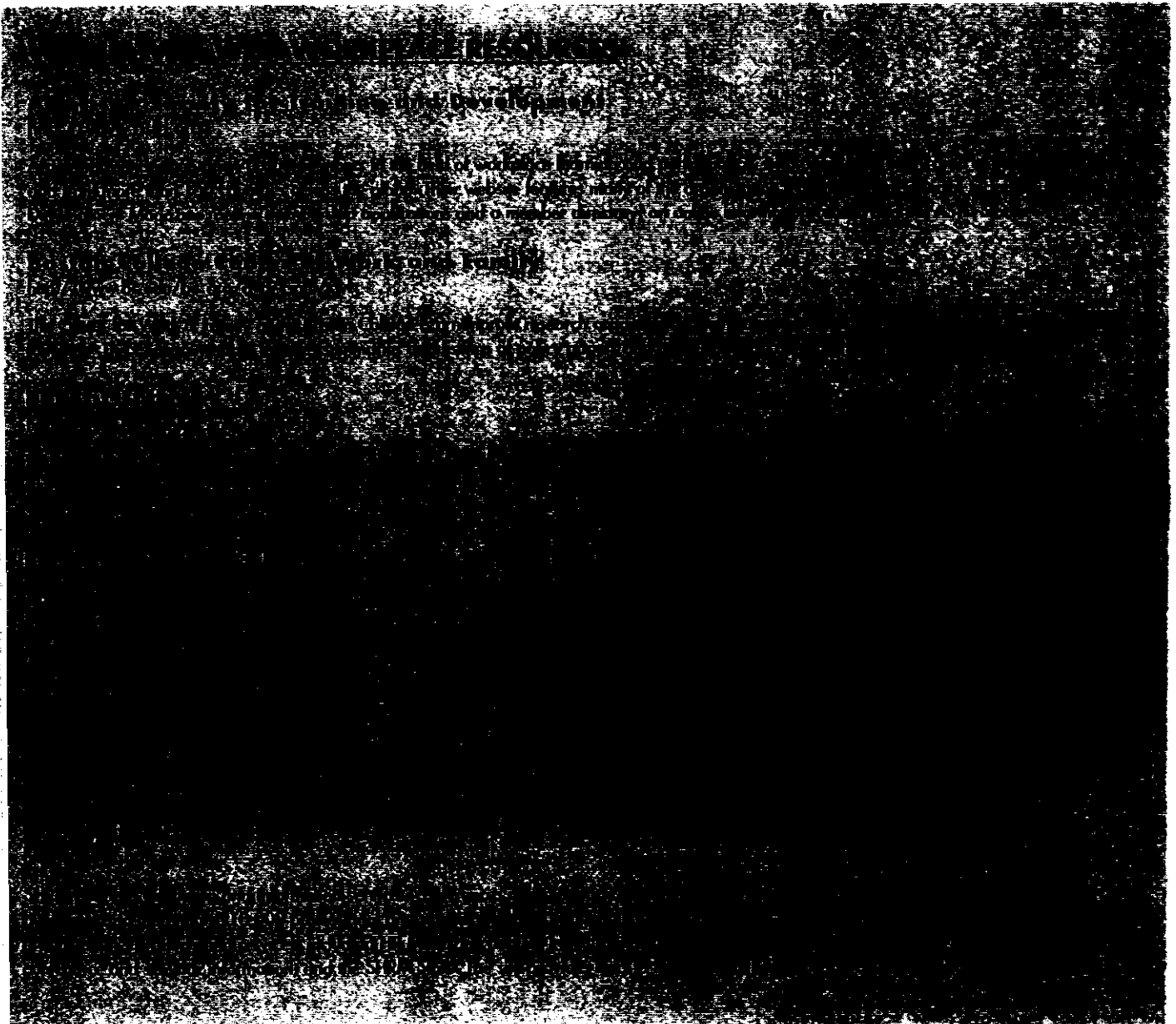
Ask the Children: What America's Children Really Think About Working Parents, by Ellen Galinsky, president of Families and Work Institute, includes key findings of a new study, with implications for how we work, how work affects parenting, and what children learn from their parents.

- The book is available from: Families and Work Institute: 212.465.2044, or www.familiesandwork.org.

Advancing Women in Business: The Catalyst Guide to Best Practices from the Corporate

Leaders features lessons from leading-edge firms, reinforced by Catalyst's own groundbreaking research and its advisory work with more than 100 companies. The book is filled with practical, hands-on advice.

- Contact Catalyst at 212.514.7600, or www.catalystwomen.org.



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Mergers

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Corporate social responsibility may not be top of mind among the deal-makers of a typical corporate merger or acquisition, but that doesn't mean that CSR issues aren't represented at the table. Consider the potential of a corporate marriage to affect a number of CSR interests and concerns:

- A company with a significant impact within its headquarters community — as philanthropist, community supporter, civic booster, and creator of local jobs — is suddenly uprooted and relocated to the headquarters city of its acquirer or larger partner.
- One partner in a merger has a much stronger ethics policy than the other partner governing gifts, kickbacks, graft, and other issues related to global commerce.
- One of the partners is considered an environmental leader, with strong environmental management systems in place and an enviable record of proactive policies, while the other partner is considered a laggard, perhaps facing significant regulatory actions or lawsuits for alleged environmental misdeeds.
- The two companies have dramatically different track records on corporate philanthropy, or significantly divergent focuses for their donations.

- One partner has implemented an effort to eliminate human rights abuses and improve working conditions among its offshore contract factories, while the other company has no such program.
- The two companies have major differences in workplace philosophy and practices, with one partner committed to work-life balance, diversity, pay equity, and open communications, while the other partner believes that employees are primarily an expense that needs to be minimized.

Few companies that have gone through mergers like to talk openly about such differences — at least not for publication — but each of these situations represent real-life examples of how CSR policies and practices can become a victim of a merger or acquisition. And each represents opportunities for merging companies to keep CSR issues at the forefront of their new relationship, perhaps even reaffirming or expanding their CSR commitments.

Culture Clash

Retaining the culture of corporate social responsibility during a merger is directly linked to another major challenge: Successfully creating a new culture overall. One of the most critical factors to a merger's success is the ability to combine the cultures of the two organizations in a way that respects both companies' pasts but also sets the stage for a new harmonious future.

This is far from easy. In fact, the failure of many merging companies to do this successfully may be the biggest reason for the startling high failure rate of mergers and acquisitions overall, say experts. Research by Mercer Management Consulting to analyze the shareholder returns generated by large acquisitions shows that since the mid-1980s, 57% of the deals worth \$500 million or more resulted in poor returns to shareholders in the following three years, relative to industry averages. Even in the 1990s, when deals have tended to be more closely linked to the acquiring company's core business strategy, Mercer pegged the success rate at barely 50%.

And Mercer's numbers may be optimistic. Other studies on mergers' failure rates — whether measured in revenue growth, share price, executive turnover, or some other metric — typically conclude that roughly three-fourths of corporate mergers don't live up to expectations.

"Culture clash is very thick," says Mitchell Marks, a San Francisco-based organizational psychologist and merger expert, and co-author of *Joining Forces: Making One Plus One Equal Three in Mergers, Acquisitions, and Alliances*. "When most deals are announced, senior executives downplay culture differences. A year later, they're on the cover of *Business Week* talking about culture clash."

(Marks will be moderating a

session on "Preserving Social Responsibility Through Mergers and Acquisitions" at this year's BSR National Conference.)

Confronting the Challenges

Marks and other experts say that the same process that can prevent a culture clash between two merging companies also can help ensure that the companies harmonize their views and practices on community involvement, philanthropy, ethics, environmental responsibility, human rights, and the many other topics in the CSR arena. They include:

- **Assessing Existing Cultures:** Should the two organizations retain their respective cultures or try to harmonize them? In some cases, companies strive to keep two merging partners' cultures distinct; others try to forge a new, unified culture. Each case presents opportunities and challenges to retain or build CSR initiatives.
- **Improving Internal Communications:** As is true in a downsizing situation, a merger or acquisition can create a great deal of anxiety, rumor, and speculation, which can significantly undermine employee morale, productivity, and commitment. Companies that communicate openly typically fare better, even if the news isn't always good.
- **Communicating Efficiently Externally:**

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A survey by Hill & Knowlton and Yankelovich Partners found 33% of Americans think most highly of companies that support education; 22% were impressed by firms that contribute to health causes; but only 3% by companies that support the arts.

— *Wall Street Journal*, 9/9/99

A new index from Dow Jones and Sustainable Asset Management found companies with an eye on their "triple bottom line" outperform other companies in the stock market. The world's top 200 "sustainable firms" outperformed other companies, particularly in the technology and energy sectors.

— *Economist*, 9/11/99

A survey by Texas-based medical products company Henley Healthcare found that the following benefits were most popular for employees as a reward for working long hours: days off (42%), clothing (22%), and tickets to theater and sporting events (20%).

— *Wall Street Journal*, 9/7/99

While women make up approximately half of the U.S. workforce, they represent only 14% of employees posted abroad by U.S. companies.

— *New York Times*, 9/12/99

A study of U.S. workers by Peter D. Hart Research Associates found that 42% said they trust employers "quite a bit," while 57% said they have "just some" or "not much" trust in employers.

— *S.F. Examiner*, 9/5/99

A CORPORATE SOCIAL RESPONSIBILITY SURVIVAL GUIDE TO MERGERS

Here are suggestions from experts and leadership companies on how to keep CSR issues alive and well during — and after — a merger:

- **Assess the pre-merger cultures.** Understand and compare the two companies' cultures, policies, and practices as they relate to the range of CSR issues: corporate governance, workplace practices, environmental responsibility, human rights, community involvement, facility siting, etc. Determine whether and how these have played a role in the companies' success — for example, their ability to attract and retain employees, their reputations among customers and communities, or other means of competitive advantage.
- **Let employees be heard.** Give employees of both companies the opportunity to make their opinions known about CSR issues: how the issues are important to them personally and how the companies' CSR policies and practices have contributed to the company's success. Provide an open forum to allow employees to express their views on CSR issues.
- **Communicate fully with employees.** Research shows that employees with a full understanding of their situation feel less stress and more in control, even if they know big changes are coming. Make sure employee communication is clear and candid, and that employees are given the chance to ask questions and express their views.
- **Set new goals.** If existing programs will be continued or expanded upon, make that known as early as possible to reaffirm to employees, customers, and others the company's CSR commitment. Whenever possible, set tangible, measurable goals.
- **Don't overlook qualitative measures.** Consider the importance of less-tangible goals, such as a company's commitment to respecting employee diversity or being an active member of a host community.
- **Help communities cope.** If a merger or acquisition will result in the closing or moving of facilities from a local community, keep all parties apprised of circumstances whenever they develop or change. Failure to do so could leave long-lasting scars in the community.
- **Engage outsiders.** Consult a variety of stakeholders to better understand how CSR issues are perceived. Consider holding meetings with community leaders or the public to gain insight into potential problems that could result from merger-related changes.
- **Think symbolically as well as substantively.** Sometimes, key company efforts take place far down the chain of command — a volunteer tutoring effort in a local community, for example, or a plant-level recycling effort that goes well beyond industry practices. Understand that these efforts can take on a symbolic importance well beyond their modest costs or impacts. Failure to embrace and absorb these efforts into the new company could become a source of friction.
- **Make the business case.** Whenever possible, demonstrate how CSR efforts provide value through increased sales, reduced costs, enhanced reputation, improved quality, customer commitment, or other means. (Supporting research and case studies may be found in Topic Overviews in the BSR Resource Center: www.bsr.org/resourcecenter.)
- **Reduce the human impact.** Examine alternative strategies for laying off employees or closing facilities. These include deploying workers to other sites, providing retraining, setting up job-sharing arrangements, and implementing voluntary separation and early-retirement programs. (Additional strategies may be found in the Topic Overview on Downsizing in the BSR Resource Center website.)
- **Consider external impacts:** Anticipate and prepare for consequences outside the workplace. Mergers and closings may trigger increases in child, spousal, and substance abuse, or other stress-related ills. Consider offering confidential access to counseling services, or extra support to social service organizations that work in these areas. ♦

Mergers

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Local communities, the nonprofit community, and other stakeholders can similarly become concerned, disillusioned, or angry at a company that is going through major changes without providing adequate disclosure.

- **Clarifying Policies:** Confusing or conflicting policies between merging

Mentoring

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Such resources couldn't have come at a better time. Large companies increasingly are pressing their suppliers to improve their company-wide environmental performance, not just the eco-impacts of their goods and services. Recently, for example, Ford and General Motors both announced that they will be requiring all of their suppliers to implement environmental management systems by 2002 in conformance with the international standard ISO 14001. Boeing, Motorola, and countless other large firms have taken similar steps.

Meanwhile, with the majority of larger companies meeting or exceeding regulatory standards, smaller firms are coming under tougher scrutiny by federal and local environmental agencies. While they recognize that typical command-and-control regulation would be difficult to implement to millions of smaller firms,

organizations — about such issues as ethics, marketplace behavior, or human rights issues — can frustrate or alienate employees, customers, or key suppliers that no longer understand the company, what it stands for, and how to do business with it.

- **Reconciling CSR Commitments:** When two firms with vastly differing commitments on environmental, human rights, or other CSR issues merge, activists, regulators, the media, and

they are seeking ways to bring these companies into regulatory compliance — and beyond. The U.S. Environmental Protection Agency is among the regulators that views mentoring as an effective, nonregulatory means of pushing environmental thinking to a broader business audience.

"Environmental mentoring is simply the use of expertise to help another entity improve its environmental management and performance," explains Walt Tunnessen, Senior Director for Business and the Environment at the National Environmental Education & Training Foundation (NEETF). "The basic goal of environmental mentoring is to provide help that enables the mentee to achieve and maintain or go beyond legal compliance and established best management practices."

Last year, NEETF founded the Institute for Corporate Environmental Mentoring, a project to support business-to-business mentoring programs

other key stakeholders may assume that the firm with the weaker policies will dominate.

Understanding the links between CSR and mergers and acquisitions is an area ripe for further study. Currently, the topic presents far more questions than answers. But as CSR increasingly becomes a key part of company strategy, it will become ever more important to manage the marriage of two companies in a way that allows CSR to survive and thrive. ♦

around the U.S. The group has been studying the leading mentoring efforts — from federal and local governments, trade associations, colleges, chambers of commerce, and multisector partnerships — to understand and propagate best practices.

Typical of company-sponsored programs is one by The John Roberts Co., a midsized Minneapolis-based printing company with a history of involvement in proactive environmental measures. In 1995, when the company was selected to participate in the EPA's pilot Environmental Leadership program — one of just twelve companies — it tested the idea of mentoring eco-management techniques to a series of small printers ranging in size from 18 to 62 employees.

A major part of that effort was taking the John Roberts environmental management system (EMS) and "minifying" it to fit the specific needs of smaller companies, says Jeffrey R. Adrian, John Roberts'

Mentoring

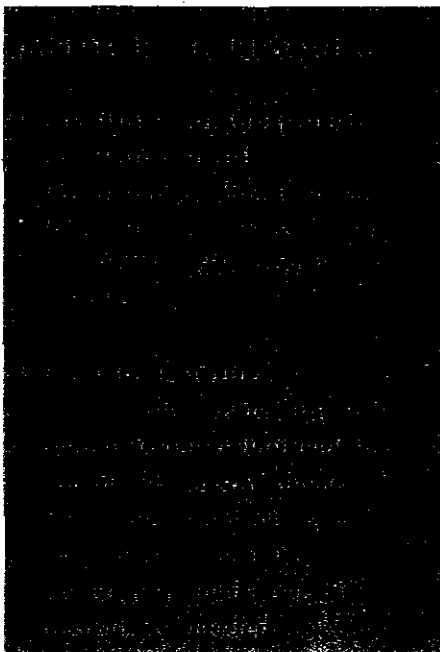
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environmental director. By doing so, he reasoned, "these companies would have a valuable tool to help them ensure their future environmental health." The valuable lesson his company learned was that "any company, with a little practical help, could accomplish the implementation of an EMS, and smaller companies could benefit greatly from an EMS sized to meet their needs."

The effort yielded dividends to the mentor, too. Adrian says that participating in the mentoring program reinvigorated his own company's environmental efforts, encouraged the growth of new ideas, and provided opportunities for effective networking.

Helping Companies Cope

Chemical giant 3M took a different approach. Working in concert with the American Furniture Manufacturers Association and another



company, Akzo-Nobel, it created a 1,100-page guidebook and CD-ROM that contain environmental requirements specific to the furniture industry. It includes basic compliance information as well as more proactive measures. The project cost the two companies about \$250,000, mostly for printing and for an outside consultant who wrote the guidebook.

Why make this investment? 3M is a key product supplier to the furniture industry and small firms represent a big market. It figured that mentoring would help those companies better meet their environmental responsibilities and use 3M products more responsibly.

Many mentor programs are localized, often involving regional business groups and government entities. One example is the Texas Natural Resource Conservation Commission's "Texas EnviroMentor" program, aimed at helping small firms in the state cope with regulations. The program matches volunteer legal and environmental professionals with small businesses needing assistance, offering site visits, workshops, and a telephone hotline.

Another local program is the Northeast Business Environmental Network, a partnership of professionals that share EMS practices and procedures. The Lawrence, Mass.-based group has amassed a database of best management practices, including "the forms, policies, and procedures actually being used by companies," which it makes available to mentees.

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EXAMPLES OF MENTORING PROGRAMS

Program	Description	Challenges and Successes
General Motors Supplier Development and Supplier Environmental Advisory Team	GM developed a training course and materials for its supplier development engineers, who work with suppliers to increase their efficiencies. The engineers facilitate problem solving and offer resources, but don't proscribe actions. GM contacts suppliers at regular intervals to track implementation of action items. The company provides incentives to suppliers to find and implement savings.	The company has found the workshops to be an effective way to identify opportunities for improvement at suppliers' facilities and in the products supplied to GM. The company has collected case studies and tracked action items and associated savings. In 1997, it identified 220 action items from a group of suppliers totaling \$44 million in projected savings. However, the company views the suppliers' successes as episodic and not readily shared throughout the supplier company or "cascaded" to the suppliers' suppliers.
John Roberts Company Environmental Mentoring	The John Roberts Co. mentors a handful of smaller printing companies in Minnesota and Wisconsin, providing one-to-one on-site help in assessing their environmental, health, and safety issues; using model materials adapted from John Roberts' operations to organize compliance documents, checklists, schedules, etc.; and reviewing mentees' efforts to address environmental management issues and specific compliance challenges.	The program has demonstrated success in raising the level of awareness of environmental issues among participating printers. For example, each made progress on developing comprehensive environmental management systems. However, there was turnover in the personnel at several of the mentored companies, leading to lost time in bringing the new people up to speed.
Pittsburgh Business Efficiency Partnership	The project, a partnership between the BSR Education Fund and World-Class Industrial Network, a project development and management consultancy in Pittsburgh, Pa., uses networking and mentoring to encourage the exchange of information to help companies increase their competitiveness through environmental efficiency. The partnership has sponsored workshops, organized plant tours, and worked with individual companies to provide technical assistance.	The program, which has involved roughly 140 individuals from 85 companies, has found the business-to-business model of information exchange to be a helpful and credible way to raise knowledge of business and environmental efficiency options. While representatives of larger companies served as valuable resources for smaller firms, the partnership found that the larger firms also gained knowledge from the smaller companies. The partnership also found that the less-successful events addressed topics generated by their own staff or organizations, rather than through consultation with the participating companies.
Santa Clara County (Calif.) Pollution Prevention Project	A voluntary county government program aimed at helping small to medium size firms cut hazardous waste generation. The mentoring portion of the program includes technology-oriented workshops and one-to-one, business-to-business mentoring, with the county acting as "matchmaker."	The workshop format, in addition to the teaching it offers, has been a spawning ground for one-to-one mentoring, as individual companies ask questions, exchange business cards, etc. Over time, several mentees have become mentors of other firms. One challenge is that the program's location within a government agency has led some potential participants to be skeptical that there was no hidden enforcement agenda.
WasteCap of Massachusetts	A public-private partnership between Massachusetts businesses and the state Department of Environmental Protection, has recruited an active group of volunteers from local companies to educate and advise other businesses on the benefits and processes of minimizing and recycling non-hazardous solid waste. WasteCap offers site visits to any company requesting one.	The program reached more than 3,000 companies in 1998, using its network of business supporters to publicize its programs, identify potential participants, and recruit volunteers. However, the site visits are very resource-intensive, with each volunteer typically doing one site visit per year, with a maximum of three to four.

Source: National Environmental Education and Training Foundation, Institute for Corporate Environmental Mentoring

Mentoring

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If all this sounds easy, it's not. Mentoring takes time, resources, commitment, and hard work on all parties' part. It can be a time- and labor-intensive endeavor for both mentors and mentees.

Beyond that are some concerns unique to mentoring that must be considered, says NEETF's Tunnessen. One issue is liability, which could be a concern if the mentoring advice results in any kind of problem for the mentee; in such cases, a mentor could incur liabilities. And theoretically, a mentor could be liable if he or she sees a

violation at a mentee's facility but doesn't report it.

Confidentiality is another issue. Mentors often must learn the nitty-gritty of mentees' operations, including proprietary ingredients and processes. Still another concern is antitrust: Certain communications among competitors could be problematic if they are construed to limit competition or otherwise seen as conspiratorial.

In day-to-day practice, these issues aren't much of a problem. After all, management consultants, who play a similar type of role as mentors, deal successfully with such issues every day. Still, they should be kept in mind when entering into any mentoring relationship.

In the end, such concerns are mere speedbumps on the road to improved environmental performance by the legions of small and mid-sized firms that previously haven't yet taken the environment into consideration in how they operate.

"Most small companies do not have an environmental manager or staff person who focuses solely on environmental performance," says Tunnessen. "Frequently, they are out of compliance because they are unaware or misinformed about regulations and don't know where to turn for help. For small companies, mentoring represents a nonconfrontational, non-threatening opportunity to open the door to new ideas." ♦

[REDACTED]

baby-boomer parents, says the *San Jose Mercury News* (9/14/99). Gen-X employees, aged 18-34, cite high pay, career development opportunities, and a chance to be challenged and valued among their key job-related concerns. Many of this generation have watched their parents be downsized and, partly as a result, have less loyalty and are more likely to consider themselves free agents. Retaining Gen-X employees will be a critical challenge for employers because this generation of workers is smaller than the boomer generation.

[REDACTED]

Companies and stakeholders worldwide are concerned about the lack of clear laws protecting consumers against e-commerce fraud, according to *Financial Times* (9/9/99). For example, European Union member states have not yet standardized their consumer protection laws. As a result, companies must comply with up to 15 different sets of national laws. Consumer groups believe such legislation would protect consumers against fraud and help build confidence in e-commerce. Business and trade groups believe additional regulation is unnecessary and could impact small businesses and U.S. companies from setting up European websites.

[REDACTED]

Consumer groups are becoming increasingly activist toward banks that sell their customers' personal and financial information to telemarketers, reports *San Francisco Business Times* (8/27/99). Among other things, consumer groups are threatening to stall key bank legislation in the U.S. Congress that would allow banks, insurance companies, and securities firms to merge into large financial services conglomerates. Currently, there is no federal protection of privacy for bank and credit card accounts.

[REDACTED]

Gen-X employees have different career expectations than their

[REDACTED]

The number of top U.S. companies that produce environmental reports has fallen by nearly a third in recent years, bucking an international trend towards increased transparency, reports *Financial Times* (9/2/99). Meanwhile, companies in Denmark, the Netherlands, Norway, and Sweden are, or soon will be, required to produce such reports. The decline in reporting may be tied to increased legal requirements that make companies less inclined to offer additional information to the public.

[REDACTED]

U.S. firms are increasingly focusing on their employees' weight as company health costs associated with obesity grow, reports the *New York Times* (9/6/99). According to researchers at the University of Virginia and the Harvard School of Public Health, obesity cost the nation \$99.2 billion in 1998 in doctor visits, lost productivity, absenteeism, and hospital stays. Firms with weight-related programs include Xerox, which says it saved more than five times its investment in health programs; and SmithKline Beecham, which created a wellness program for 1,600 employees who reported weight problems.

[REDACTED]

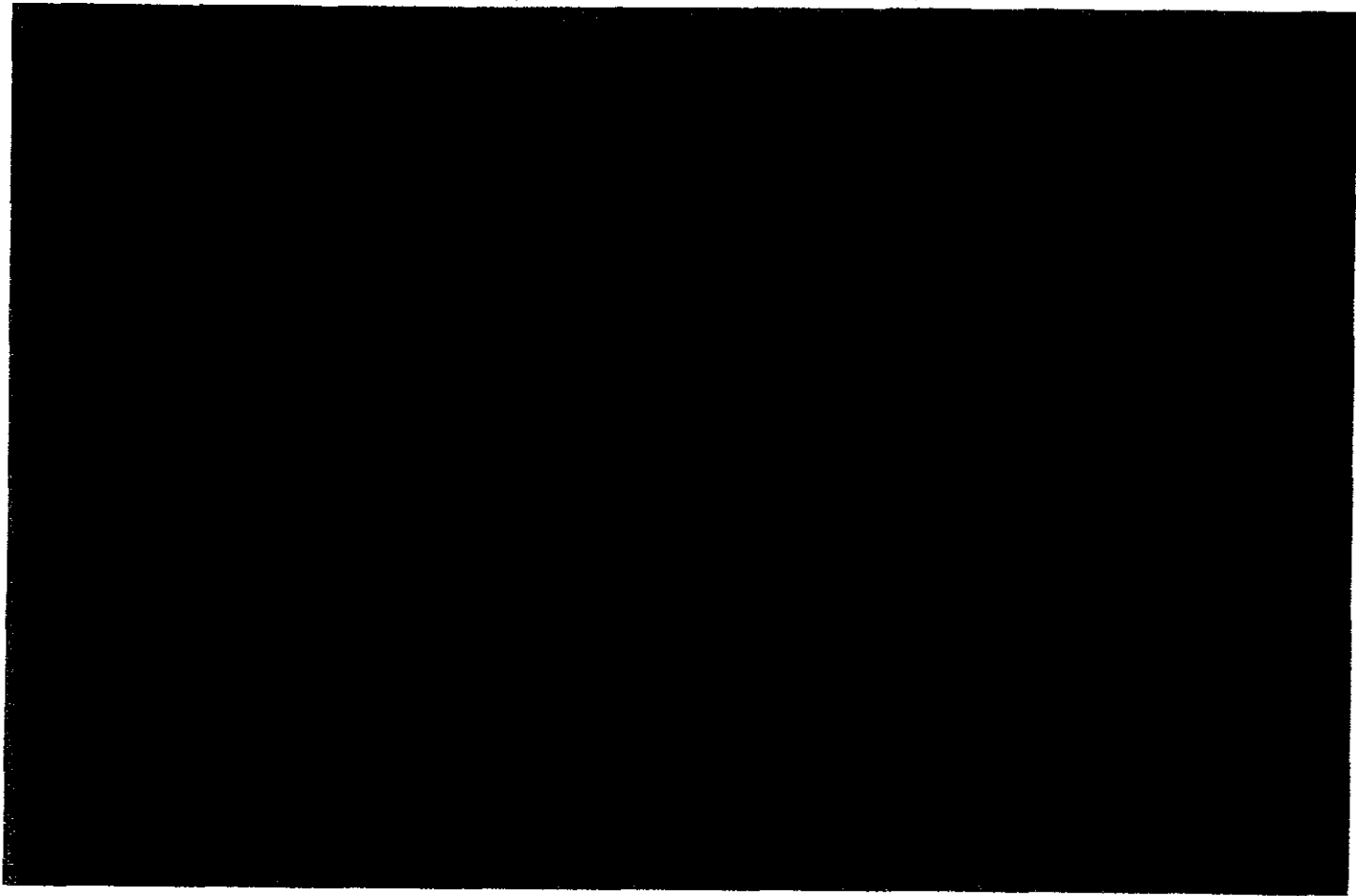
Companies are beginning to understand that age is an important element in workplace diversity as they see an increase in the number of senior citizens who continue to work past the standard retirement age, reports *USA Today* (9/10/99). As a result, companies are increasingly relaxing rules that often force CEOs and others to retire at age 65. Among the many firms with seniors in top positions are Dillard's Department Stores, Hal Riney & Partners, Quick & Reilly, Tootsie Roll, and Viacom.

[REDACTED]

A recent Executive Order by President Clinton promises to usher in a new era of "bio-based" products and services - fuels, chemicals, energy, and other products derived from trees, crops, and agricultural and forestry waste, reports *The Green Business Letter* (9/99). Clinton's directive notwithstanding, a bio-based economy already has taken root, with massive investments being made by companies in a wide range of sectors to produce or use bio-based products to replace petrochemical- and forestry-based ones. Bio-based products have potential to give productive life to tons of agricultural waste currently being burned or landfilled.

[REDACTED]

Female executives say that while the burgeoning e-commerce sector has created new opportunities for them, gender barriers still remain, writes the *San Jose Mercury News* (9/14/99). One barrier is the perception among high-tech women executives that qualified men are more likely than qualified women to be promoted. Many women are attracted to high-tech firms by flex time and other family-friendly policies, but later find promotion requires long hours and a more "traditional" career path. ♦



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EPRI / Gas Research Institute

Lafayette, California

ABOUT THE GLOBAL ENERGY PARTNERS, LLC

Global was established in 1998 as a strategic alliance between three energy technology leaders: EPRI, the Gas Research Institute (GRI), and Daniel, Mann, Johnson and Mendenhall (DMJM). EPRI and GRI bring to Global world-renowned expertise in energy technology development and commercialization, energy market analysis, and energy use across all energy sectors.

Through the acquisition of NEOS Corporation at the beginning of 2000, Global further enhanced its unique blend of talent, ability and perspective with NEOS' fifteen years experience providing technical and management consulting services to utilities, energy services companies, private industry, and government agencies.

A thorough understanding of both public and private sector operations enables Global to focus on workable solutions and implementation. This means not merely studying a client's problems, but offering innovative and technically sound solutions, and assistance in implementing those solutions. Global brings a fresh approach to the restructured energy industry—an approach that focuses on overcoming market barriers and making clean, efficient technology attractive to energy users.

Global employs professionals trained in engineering, economics, planning, environmental science, computer science, business administration, marketing, and physical and social sciences. Based in Lafayette, California, Global employs a staff of 15 professionals. A listing of key staff for this project is provided in this document.

ELECTRIC POWER RESEARCH INSTITUTE (EPRI)

EPRI is a nonprofit organization committed to providing science and technology-based solutions of indispensable value to our global energy customers. We manage a far-reaching program of scientific research, technology development, and product implementation addressing the entire spectrum of electricity supply, delivery, and applications.

EPRI's technical staff includes over 200 individuals who are experts in electricity generation, transmission, distribution, and end-use, as well as in associated issues such as energy system planning and environmental concerns. The EPRI Environment Division conducts a comprehensive program of research covering a broad range of critical climate

change issues, including policy and economic analyses, impacts of climate change, and mitigation options. EPRI is well-connected with private-sector energy companies in the United States and internationally, with governmental agencies, and with bodies functioning under the UN Framework Convention on Climate Change (UNFCCC). Results of EPRI analyses and assessments-made widely available through peer-reviewed literature have been influential in U.S. and international policy deliberations.

Beyond climate change expertise per se, EPRI expertise in power generation efficiency, renewable energy and energy efficiency, and electric transportation is particularly relevant to the subject project.

GAS RESEARCH INSTITUTE (GRI)

GRI manages a comprehensive research, development and commercialization (RD&C) program for the natural gas industry. GRI's mission is to deliver high-value technology, information, and technical services to gas and related energy markets.

GRI's RD&C program has two main components:

- *A cooperative program* to deliver technology, services and information resources that can be widely applied to provide mutual benefits to the gas industry and consumers.
- *Commercial programs*, in which individual companies and consortia partner with GRI through investments to develop and deliver technology, services and information to meet business-specific goals that improve competitiveness and benefit customers.

GRI's staff of 175 includes scientists, engineers, researchers, business development and marketing, and sales professionals. Most are based at the company's headquarters in Chicago.

EXPERIENCE

Promoting adaptation as an effective option for reducing the risks associated with climate change while minimizing need for costly, near-term interventions

Ongoing debates in global climate policymaking focus almost exclusively on one risk management option—near-term mitigation measures for reducing or offsetting greenhouse gas emissions. Such measures are apt to be expensive: Preliminary analyses of recent proposals such as those contained in the Kyoto Protocol suggest that the economy-wide costs of reducing CO₂ emissions in the near term could exceed \$100 billion annually in the United States alone.

Adaptation represents a promising risk management alternative that could limit the need for near-term mitigation measures, thereby minimizing disruption to society. Some adaptation to climate change will inevitably occur. Anticipatory adaptations—prudent,

low-cost measures for adjusting social, economic, or ecological systems to decrease risks and potential impacts—could prove beneficial under current weather variability while reducing future vulnerability.

For example, revised coastal zoning rules could prevent new development in flood-prone areas, while new weather-resistant crops could maintain agricultural productivity under changed conditions. EPRI studies indicate that adaptation could reduce the impacts to key economic sectors by billions of dollars.

Despite its promise and inevitability, adaptation has received insufficient attention from policymakers and research funding agencies, both domestically and internationally.

EPRI Strategy

The Climate Adaptation Initiative is designed to broaden global research to incorporate adaptation within the portfolio of risk management options being considered by climate policymakers.

The initiative, launched in 1999, is scheduled to continue through 2001. It includes outreach efforts within the scientific and policymaking communities, as well as continuing EPRI research focused on four topics: regional and local effects, market adaptation, ecosystem adaptation, and health effects. Deliverables will include knowledge and strategies to support development and implementation of effective adaptation measures and strategies.

In a major outreach effort, EPRI initiated and cosponsored a workshop with the U.S. Department of Energy, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the National Science Foundation (NSF), and the John S. Heinz Center for Science, Economics, and the Environment. The goals of the workshop were to expand the discussion of climate change options to include adaptation and to catalyze the discussion of adaptation options among possible research funding agencies.

EPRI research activities and progress are described below for the following areas: regional and local, human health, and ecosystem impacts.

Because adaptation to climate change will occur at regional and local levels, it is necessary to understand the influence of rising atmospheric concentrations of greenhouse gases at these scales. Techniques are needed to "downscale" the outputs from general circulation models (GCMs) to the finer spatial resolution required for examining impacts at local and regional scales. Five statistical downscaling methods were evaluated in EPRI-sponsored studies, and the method deemed most reliable was adapted for use in forecasting hydrologic impacts in specific water basins. The method has been applied to conduct two multi-week simulations of observed climate extremes (historical droughts and floods in the United States) using seven regional climate models. Technical papers

describing the results of this intercomparison were submitted to peer-reviewed journals. Multi-year simulations are currently under way with three of the regional models using downscaled GCM outputs for future "Business as Usual" and "stabilized CO2 emissions" scenarios as drivers.

With regard to human health, climate effects are both direct (e.g., heat stress) and indirect (e.g., through mosquito habitat changes). Most projections of how future climate change might affect health have not addressed adaptation, resulting in estimates of potential problems given no societal response. An EPRI project was initiated in 1999 to study the health effects of heat waves; climatologists predict that an increase in global temperature may be accompanied by an increase in the frequency of heat waves. This project will analyze the impact of heat episodes in selected major urban centers in northern and southern Europe, including London, Athens, Amsterdam, Stuttgart, and Stockholm. Results will inform national and international efforts to mitigate the health effects of heat episodes.

To improve knowledge of ecosystem impacts, EPRI has pooled resources with the National Aeronautics and Space Administration, U.S. Forest Service, and NSF to sponsor development of a new generation of dynamic global vegetation models (DGVMs). Previous models offer limited insight into the dynamic response of ecosystems to climate change. New DGVMs, in conjunction with existing state-of-the-art biogeochemical cycle models, are being applied to answer questions about how transient climate change may affect the vegetative structure, biogeochemistry, and carbon exchange properties of these systems. Scientific papers documenting the development and use of these models are being submitted to peer-reviewed journals.

By establishing adaptation as a viable option for reducing long-term risks associated with climate change, EPRI's initiative will lead to more informed national and international policymaking. This reduces the likelihood that unnecessarily stringent controls will be placed on near-term greenhouse gas emissions, potentially saving hundreds of billions of dollars for the U.S. economy alone.

The knowledge and adaptation strategies developed under this initiative could also yield huge economic benefits by enabling vulnerable market sectors worldwide to minimize potential impacts. In addition, these deliverables may underlie new business opportunities for companies that assist others in adapting to climate change.

Society will benefit from the development and implementation of informed policies and adaptation strategies that promise to cost-effectively reduce the economic, ecological, and human health impacts from climate change.

FACILITIES

Please see attached forms which detail conference facilities at EPRI Headquarters in Palo Alto, California and at the Gas Research Institute in Chicago, Illinois.

RESEARCH WORK AND PAPERS

The Global team is highly qualified to manage various research tasks related to climate change and its impacts on economic development in India. In particular, Global's partner EPRI has conducted numerous R&D tasks related to this topic including:

- EPRI has conducted a number of research assignments on climate change policies and their economic and physical impacts. EPRI-supported research at institutions such as the Massachusetts Institute of Technology and Battelle Pacific Northwest National Laboratories is highly influential in informing U.S. and international policy deliberations.
- EPRI has pioneered research on the potential effects of, and adaptation to, climate change, resulting in publication of two books and a World Bank volume applying the techniques to agriculture in India.^{1,2,3}
- EPRI has worked closely with U.S. governmental agencies to establish a program designed to define the potential role of adaptation in reducing physical and economic impacts of climate change.
- EPRI has existing relationships with Indian research organizations, and recently co-funded a project with the World Bank to measure the impact of climate change on Indian agriculture.
- EPRI developed in 1996 a technical report, titled *Workbook for Screening Greenhouse Gas Reduction Options*, and accompanying software to provide the analytic tools and concepts to identify and evaluate a broad range of greenhouse gas reduction or sequestration options for electric utilities. The Workbook presents the principles of accounting for the costs of alternative on- and off-system options, for estimating their emissions impacts, and for valuing the reductions. The Workbook provides a solid foundation for developing similar methods for India.
- EPRI staff has conducted substantial research on the implications of climate change policy for energy system development, and on GHG emissions reduction baselines, additionality, monitoring and verification, and other issues related to market-based instruments. As a nonprofit energy research

¹ Mendelsohn, R. and J. Neumann, eds (1999). *The Impact of Climate Change on the United States Economy*. Cambridge University Press.

² Mendelsohn, R., ed. (in press). *Global Warming and the American Economy. A Regional Assessment of Climate Change*.

³ Dinar, A., R. Mendelsohn, R. Evenson, J. Parikh, A. Sanghi, K. Kumar, J. McKinsey and S. Lonergan (1998). *Measuring the Impact of Climate Change on Indian Agriculture*. World Bank Technical Paper No. 402.

organization having preexisting relationships with Indian organizations such as the Indian Institute for Management and the Tata Energy Research Institute, EPRI is uniquely positioned to provide the training and establish a long-term relationship envisioned under this task. In a similar effort, EPRI has recently partnered with Eskom in South Africa to establish the African Center for Energy and the Environment, which provides training and technology transfer on energy-related environmental issues.

- *Gas Industry Gas Emissions Technology.* This project seeks ways to: 1) optimize the U.S. natural gas system, electric and natural gas utility systems, and industrial/energy processes to minimize greenhouse gas emissions while reducing operating costs; and 2) transfer air emissions and gas loss reduction technologies to the gas industry. U.S. compliance with regulations to reduce emissions of greenhouse gases will require optimization of energy systems to minimize emissions while maximizing efficiency. Studies will address this optimization issue by evaluating: 1) potential changes to current natural gas industry operating and maintenance practices to boost efficiency while reducing emissions; 2) low-emitting technologies that take advantage of the inherent low carbon-to-hydrogen ratio of natural gas; 3) potential decreases in emissions and operating costs that would result from regionally combining electric and gas utilities; 4) systems that approach zero emissions by converting wastes to products, reducing transportation costs through better siting, or take advantage of synergisms that exist by co-locating interdependent industries.

Issues Papers

- The United Nations Framework Convention on Climate Change
- The Kyoto Protocol: A Summary of Key Issues
- The Role of Developing Countries in Stabilizing Atmospheric CO₂ Concentrations
- Regional Impacts of a U.S. Carbon Tax
- The Value of 'Where and When' Flexibility
- Overview of Climate Change Market Impacts in the United States
- Impacts of a Carbon Tax on U.S. Consumers
- Insurance Claims as an Indicator of Global Climate Change
- The Kyoto Protocol in the Context of the Long-Term Goals of the UN Framework Convention on Climate Change
- The Need for a Global Energy Technology Strategy
- The Economic Costs of the Kyoto Protocol
- Potential Health Effects of Climate Change
- Energy Policy Integration and Coordination (EPIC): An Integrated Assessment of Air Quality Regulations and Global Climate Policy
- Carbon Mitigation & Sequestration

KEY PERSONNEL

The Global Energy Partners (GEP) International Team

Mr. Gregory A. Winkler – Project Manager and Principal: As director of Global's international business practice, Mr. Winkler conducts technical, economic and financial assessments related to the electric industry. His expertise addresses such contemporary industry topics such as electric industry liberalization and privatization, project development and financial assessment, energy efficiency/DSM program planning and evaluation, environmental assessments and public/private partnership development. He has just completed a 19-month assignment as the resident planning advisor to the Electricity Generating Authority of Thailand. In that capacity, he advised EGAT on a number of policy issues related to Thai electric industry privatization, energy efficiency program development, monitoring and evaluation studies, long-range strategic planning, and energy service company market development. He has over 15 years of consulting experience working primarily with electric and gas utilities. Mr. Winkler holds a M.S. in Economics and a Master of Urban Planning, both from the University of Oregon, and a B.S. in Energy Economics from the University of California at Davis.

Mr. John Kotowski, Ph.D.—President Global Energy Partners: Dr. Kotowski has over 26 years experience managing and directing major technical support service contracts for commercial clients and government entities. He has been directly involved for the past 24 years in various energy related technical support and technology development/applications for electric and gas utilities and commercial/industrial clients. These efforts have focused on strategic management consulting, market assessment and development, energy and water management, environmental studies, and energy systems technology development and application. Dr. Kotowski holds a Ph.D. in Physical Chemistry from Boston College.

Mr. Ken Gudger - Chief Executive Officer Global Energy Partners: Mr. Gudger has extensive experience in all phases of the electric power industry. For over 15 years he held numerous senior management positions at Southern California Edison Company in Transmission, Substations, Distribution, Customer Service, and Energy Efficiency and Marketing. In 1991 Mr. Gudger assumed Executive leadership of Southern California Edison's Energy Efficiency program. As Vice President of Energy Efficiency his organization developed a reputation as a nationwide leader in the U.S.; receiving special recognition from energy customers, Washington D.C., and various special interest groups such as the National Resources Defense Council. After leaving Edison in 1996 he has provided advice and consulting services to those involved in the new and emerging unregulated American Electric Energy Industry. Early in 1997 he developed a paper on the newly emerging "Open Market Energy Customer (OMEC)" which described the restructured energy marketplace from the energy consumer's point of view. In September of 1997 Mr. Gudger gave testimony before the U.S. House Commerce Committee on the possible impacts that utility restructuring may present to the residential, commercial, industrial, and agricultural energy consumers.

Mr. Gary Hirsh - Vice President Global Energy Partners: For over 15 years, Mr. Hirsh has supported various technical assessments related to the energy industry. His past experience includes conducting policy marketing and branding assessments related to alternative fuel vehicles, electric motors, industrial processes, and urban renewable and resource sustainability. Prior to joining Global, he was the Assistant Director of the Washington State Energy Office and a Vice President for Macro International. He holds a B.S. from the Evergreen State College.

Ms. Patricia Hurtado - Senior Associate Global Energy Partners: Ms. Hurtado has over 20 years experience consulting to the energy sector. For the past nine years, she has conducted projects related to strategic planning, market evaluation, program design, implementation and performance assessment, energy conservation measures analysis, pollution reduction technology assessments, building analysis and engineering modeling, distribution and retail sector analysis, and privatization evaluation in the electric utility sector. Her consulting assignments have been conducted for clients both within the United States as well as abroad principally in Puerto Rico, Mexico, Columbia, Venezuela and Thailand. She holds a M.S. in Mechanical Engineering from Stanford University and is a registered Professional Engineer in the State of California.

Mr. Richard Milward - Senior Associate Global Energy Partners: Mr. Milward has over eight years experience in research, statistical and economic analysis of utility resource-related economic and technical data. He has particular knowledge and expertise in financial and economic cost analysis with a particular emphasis on industrial facilities. Industries with particular field expertise related to energy processes include wood products, industrial machinery, and health services. He has performed competitive rates analysis for electric utility clients including assessing potential competitors and their potential impact on the utility's market share. Mr. Milward has expertise in the economic, financial, statistical, and econometric analysis of electric utility data, including forecasting, feasibility studies, cost estimation, and resource valuation. He has considerable economic research and analysis experience related to the use of electricity and water resources and the associated economic impacts of resource utilization. He holds an M.S. degree in Agricultural Economics from the University of California at Davis.

Mr. Russell Goold - Analyst Global Energy Partners: Mr. Goold conducts technical assessments related to distributed generation technologies and urban waste management programs. Prior to joining Global, he was the integrated waste management specialist for the California Integrated Waste Management Board where he coordinated and managed jurisdictions on Board-issued compliance orders and identified performance gaps in waste reduction programs. He holds a B.S. degree in Environmental Policy Analysis and Planning from the University of California at Davis.

Mr. Neil Podkowsky - Analyst Global Energy Partners: Mr. Podowsky conducts economic assessments related to distributed generation technologies and open market customer technology assessments. He holds a B.S. degree in Economics from Washington University.

EPRI Team - Environment Division Team Members

Dr. Richard Richels- Dr. Richels directs global climate change research at EPRI in Palo Alto, California. In previous assignments, he directed EPRI's energy analysis, environmental risk, and utility planning research activities.

Dr. Richels received a B.S. degree in Physics from the College of William and Mary in 1968. He was awarded an M.S. degree in 1973 and Ph.D. degree in 1976 from Harvard University's Division of Applied Sciences. While at Harvard he was a member of the Energy and Environmental Policy Center and a consultant to the National Science Foundation and the Rand Corporation.

Dr. Richels has served on a number of national and international advisory panels, including committees of the Department of Energy, the Environmental Protection Agency and the National Research Council. Most recently, he served as an expert witness at the Department of Energy's hearings on the National Energy Strategy and testified at Congressional hearings on priorities in global climate change research. He was also a lead author for the Intergovernmental Panel on Climate Change (IPCC) Working Group III.

Dr. Richels is a coauthor of *Buying Greenhouse Insurance - the Economic Costs of CO2 Emission Limits* (with Alan Manne). He has written a number of papers on operations research, energy policy, and energy research and development. He has served as Editor of the Energy, Environment and National Resources area of the *Operations Research Journal*. He has also served on the Board of Editors of *The Energy Journal* and the *Journal of Applied Stochastic Models and Data Analysis*.

Dick Bratcher – Mr. Bratcher serves as Manager, Global Climate, with responsibilities for strategic planning, operational management, technical communications, and project management.

Prior to rejoining EPRI in 1999, Dick was President of Science & Technology Management, Inc., a consulting firm specializing in analysis and communication of energy and environmental issues. His professional background includes a previous two-year term with EPRI, several years of service at Wisconsin Electric Power Company

(culminating in assignments as Manager of Environmental Planning & Projects, and Manager of Research & Development), and several years working in R&D and special projects at the California State Water Resources Control Board.

Dick received a B.S. degree in Environmental Engineering (1974) and a M.S. degree in Environmental Health Sciences (1975), both from The University of Michigan. His research interests have spanned a range of energy/environmental issues, including water quality, air quality, combustion waste management, acid deposition, and global climate change.

Dr. Kristie L. Ebi- Dr. Ebi is a Technical Manager of Health Studies in the Global Climate Change Business Area in the Environment Group. Dr. Ebi joined the group in 1997. Her research activities focus on the potential health effects associated with climate change. In addition, she is a Manager of Epidemiology in the EMF Business Area.

She has been with EPRI since 1993. Prior to that, Dr. Ebi was an Epidemiologist at Failure Analysis Associates, Inc. where she designed, managed, and interpreted epidemiological investigations of the cause(s) of adverse health effects resulting from the alleged action of drugs, chemicals, medical devices, and other agents in occupational, environmental, and residential settings. She resided in London, England from 1985-1990 where she conducted research in the Department of Environmental and Preventive Medicine at The Medical College of St. Bartholomew's Hospital and conducted post-doctoral research at the London School of Hygiene and Tropical Medicine. Her areas of research included chronic respiratory and cardiovascular diseases. Previously, Dr. Ebi was an Industrial Toxicologist with General Motors Corporation, and a Toxicologist with Equitable Environmental Health, Inc.

Dr. Ebi received her Ph.D. and M.P.H. in Epidemiologic Science from The University of Michigan, her M.S. in Toxicology from the Massachusetts Institute of Technology, and her B.S. in Biochemistry from Michigan State University.

Dr. Chuck Hakkarinen - Dr. Hakkarinen is the Technical Manager of the EPRI Environment Group. Currently responsible for projects addressing the atmospheric science aspects of climate change [including the internationally-funded ACACIA ("A Consortium for the Application of Climate Impact Assessments) and studies on weather and climate extremes and downscaling of GCM model outputs for regional scale

analyses], plume downwash modeling, and seabreeze modeling. He also coordinates the development and publication of Air Quality Briefs for the Air Quality Health & Risk targets. He has worked at EPRI in various project and program management positions in the Environment Group and its predecessors since 1974.

He received the B.S. degree in Mathematics in 1971 and the M.S. degree in Meteorology in 1972 from the University of Maryland, and the Doctoral degree in Environmental Science & Engineering from UCLA in 1978.

He has authored or co-authored 12 technical papers on international acid precipitation monitoring, global climate modeling, and plume downwash modeling in conference proceedings and peer-reviewed journals, has served on U.S. government agency advisory panels on acid precipitation, on climate information issues, and organized in 1994 a regional climate model evaluation project and workshop for the Intergovernmental Panel on Climate Change (IPCC). He was a peer reviewer for the IPCC Interim Scientific Assessment on Climate Change in 1994 and the NOAA Climate Monitoring and Diagnostics Laboratory in 1997, and now serves on the NSF Climate Simulation Laboratory Allocation Panel and the NOAA Strategic Plan Advisory Committee. He was elected the initial Chair of the ACACIA Executive Board for 1997-1998, and his term has been extended by the ACACIA membership through 2000.

Mr. Larry J. Williams - Mr. Williams is a Manager working for the Global Climate Change Business Area at the Electric Power Research Institute (EPRI) in Palo Alto, California. The Climate Business Area, within the Environment Group, develops information, methods, and analyses, which help inform climate change policymaking and helps electric utilities manage the risks associated with the climate issue.

Dr. Williams has worked in a variety of areas at EPRI. Earlier work included research discussed on environmental and economic aspects of energy usage. Present work includes integrated assessment of climate change policy proposals and the potential impacts of global climate change. This includes carbon cycle research as well as state-level economic impact analysis.

Upon joining EPRI Dr. Williams taught physics at the University of Southern California, where he was also Assistant Director of the Energy Resources Laboratory.

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He was a National Fellow at the Hoover Institution at Stanford University in 1978 and a Visiting Scholar in the Department of Economics at Stanford from 1982 through 1984.

Dr. Williams holds a Ph.D. degree in Physics from Iowa State University. He also received a M.S. degree in Economics from the University of Southern California.

Dr. Williams is a member of the American Economics Association and the American Association for the Advancement of Science

Dr. Thomas F. Wilson - Dr. Thomas F. Wilson is a Technical Manager in the Global Climate Change Business Area in the Environment Group at the Electric Power Research Institute (EPRI) in Palo Alto, CA. His current research activities focus on a variety of climate-related issues: costs of alternative policies and the role of technology R&D in potentially reducing these costs, estimating the potential economic benefits derived from slowing or averting climate change (including market effects and ecosystem effects), exploring mechanisms for allowing flexibility in domestic and international climate policies (e.g., emissions trading, Joint Implementation and the Clean Development Mechanism), and providing information and methods to help electric utilities make decisions in the face of climate policy uncertainty.

Dr. Wilson joined EPRI in 1985 as a Project Manager in the Risk Analysis Program in the Environment Division. There, Dr. Wilson's activities focused on risk management for a variety of environmental issues (e.g., global climate change, acidic deposition, electromagnetic fields, air toxics and non-combustion wastes) and decision support methodologies (e.g., technology choice, siting, making decisions involving multiple objectives and multiple stakeholders).

Before joining EPRI, Dr. Wilson worked at ICF Incorporated, Stanford's Energy Modeling Forum and International Energy Program, and Brookhaven National Laboratory.

Dr. Wilson received a B.S. degree (1976) in Statistics from the University of North Carolina, Chapel Hill. He received his M.S. degree (1980) and Ph.D. (1981), both in Operations Research, from Stanford University.

POTENTIAL RESEARCH TOPICS

The following are a series of research topics the Global Energy Partner consortium would be interested in co-hosting a forum:

- Potential Health Effects of Climate Change
- India State-Level Assessments of Climate Change Management
- An Integrated Assessment of Air Quality Regulations and Global Climate Policy
- Analyze the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
- Analyze current trends in global change, both human-induced and natural, and projects major trends



Global Energy Partners, LLC

AN EPRI, GRI, DMJM COMPANY

July 21, 2000

Mr. Erik Brejla
The Louis Berger Group, Inc.
1819 H Street, NW, Suite 900
Washington D.C. 20006

RE: USAID/India – Greenhouse Gas Pollution Prevention Project

Dear Erik:

On behalf of Global Energy Partners, LLC and our affiliate companies EPRI and GRI, we are proud to confirm our acceptance, in principle, to co-host a Greenhouse Gas Pollution Prevention Project Research Forum, which will focus on analyzing the impacts of climate change on economic development in India. The respective research topic(s) could be agreed upon based on our expertise and in consultation with other partners who may extend support for the related activities. The terms and conditions for conducting research and publishing the respective papers would be mutually agreed upon. If necessary, an MOU in this regard could be signed on the terms and conditions agreed upon by both parties.

Please give me a call if you have any questions.

Very truly yours,

John Kotowski, Ph.D.
President

101-12-1

Research Forum Topics

The following topic areas would be of particular interest to BSREF in conducting/co-hosting a research forum for the USAID/India - Greenhouse Gas Pollution Prevention Project.

1. Climate impact "footprinting"
2. Energy eco-efficiency
3. Green power purchasing and/or on-site generation
4. Carbon offsets

Staff who have expertise in these areas are:

Kathleen O'Donoghue has been the Director of BSREF's Business and the Environment Program (B&E) Program since September 1998 and is the principal author of the Sustainable Commerce Program (SCP). Ms. O'Donoghue has primary responsibility and accountability for the design and development of environmental/sustainability projects, products and services and the management of program revenue generation and allocation. Additionally, she leads consulting projects for a number of BSREF member companies, among them currently: Boreal Algonquin Squibb, McDonald's, General Motors, Dow, Dell and Nike. Prior to joining BSREF, Ms. O'Donoghue was the Executive Director and Chief Operating Officer for the International Society of Logistics (ISL), a 10,000 member professional association with an operating budget of \$1.5M.

At the ISL she pioneered an innovative approach to corporate environmental management, i.e. the application of logistics engineering tools and logistics support planning methodologies to pollution prevention, eco-efficiency and sustainability initiatives. Ms. O'Donoghue has over 9 years experience working as an environmental and total quality management consultant and trainer/instructor for various government agencies and a diverse set of industries including ABB, Raytheon, Indigo Development, Nord, Pratt and Whitney and IBM. Key areas of expertise include: pollution prevention, design for environment, environmental management systems, and cost accounting, extended product responsibility, eco-efficiency and industrial ecology.

Johnna Bullock is a Manager in the Business and the Environment group and leads BSREF's Climate program. The Climate program helps business reduce and offset greenhouse gas emissions through focus on lateral efficiency, green power, carbon offsets, and clean transportation. Ms. Bullock works in partnership with business, government, and non-government organizations to develop pilot projects designed to reduce global warming. She assists the US EPA develop strategy and policy for the Climate Wise program and works directly with companies such as General Motors, Nike, Petropac, and Oracle helping them identify and implement carbon emission reduction programs. She helps develop regional networks of companies such as the New Jersey Climate Wise Partnership that add value to business and the broader community of stakeholders through peer exchange, recognition of best practices, and collaboration.

Ms. Bullock has 20 years of environmental experience in the public and private sectors. She was a facilities planning manager and state and local liaison for AIA's Engineering Division in Northern California. She managed a host of projects ranging from transportation to hydro and nuclear energy projects for state agencies such as the California Public Utilities Commission, the California Air Resources Board and the California Environmental Protection Agency. These projects include preparation of environmental impact reports, rule and policy revision, permitting and siting, new facilities, and hazardous waste site remediation. She worked with the environmental movement and policy development for electric deregulation in California. Ms. Bullock received a Bachelor of Science in Environmental Economics and Policy from the University of California, Berkeley and a Master of Science in Environmental Management from the University of San Francisco. She is currently pursuing a Master of Divinity degree from the Graduate Theological Union in Berkeley, California.

REV. VANESSA COBY

Forum Information Data for each Organization

1. **Organization Name**
Global Energy Partners, LLC for Gas Research Institute (subcontractor to Global)
2. **Address**
3569 Mt. Diablo Blvd., Suite 200
Lafayette, California 94549 USA
Tel: +1 925 284-3780
Fax: +1 925 284-3147
3. **Type institution: Academic, Research, Industry, Industry**
4. **Contact Name, Telephone, Fax, E-Mail**
Greg Wikler, Principal, Global Energy Partners
Tel: +1 925 284-3780
Email: gwikler@gepllc.com
5. **Facilities available at each potential location:**
Gas Research Institute (GRI) conference facilities in Chicago, Illinois
6. **Size of meeting/conference rooms**
World class facilities capable of handling up to 50 meeting delegates
7. **Catering facilities for participants**
Offsite catering services required
8. **Technical facilities available: computer projectors, copying, etc.**
All facilities available and adhere to current industry practices
9. **Recent conferences and forums at organization location**
Numerous conferences and forums held each month at location
10. **Housing accommodations nearby [rates]**
Hotel rates vary from \$150 to \$250 per night in the Chicago area
11. **Local and international transport available**
O'Hare International Airport is 20 miles west of the GRI headquarters
Local bus, shuttle and taxi service available from the airport
12. **Working Environment: busy, tranquil, noisy, quiet, etc.**
Research environment
13. **Facilities Environment: City, urban, academic, rural**
Suburban surroundings
14. **Potential entertainment/recreational activities nearby**
University of Chicago campus is located in downtown Chicago
Downtown Chicago—major metropolitan area with a variety of activities available
15. **Technical experts/specialists on GHG located at facility**
GHG experts available at facility
16. **Research reports on GHG at facility or organization**
Library facilities available at facility
17. **Related expertise available at facility on energy efficiency, conventional/renewable power generation, transportation, solid waste, etc.**
All available at facility

18. Additional related resources available: research labs

A number of labs and research facilities are located within a 100 mile radius of EPRI headquarters; these include:

- University of Chicago
- Northwestern University
- Argonne National Laboratories
- Commonwealth Edison Company
- Institute of Gas Technologies

19. Special Characteristics of facility/organization

Excellent venue for forum

20. Approach of Organization to GHG concepts

Please refer to July 18, 2000 capabilities statement for Global Energy Partners LLC team

**GLOBAL ENERGY PARTNERS LLC
EPRI / GAS RESEARCH INSTITUTE
Lafayette, California**

ABOUT THE GLOBAL ENERGY PARTNERS, LLC

Global was established in 1998 as a strategic alliance between three energy technology leaders: EPRI, the Gas Research Institute (GRI), and Daniel, Mann, Johnson and Mendenhall (DMJM). EPRI and GRI bring to Global world-renowned expertise in energy technology development and commercialization, energy market analysis, and energy use across all energy sectors.

Through the acquisition of NEOS Corporation at the beginning of 2000, Global further enhanced its unique blend of talent, ability and perspective with NEOS' fifteen years experience providing technical and management consulting services to utilities, energy services companies, private industry, and government agencies.

A thorough understanding of both public and private sector operations enables Global to focus on workable solutions and implementation. This means not merely studying a client's problems, but offering innovative and technically sound solutions, and assistance in implementing those solutions. Global brings a fresh approach to the restructured energy industry—an approach that focuses on overcoming market barriers and making clean, efficient technology attractive to energy users.

Global employs professionals trained in engineering, economics, planning, environmental science, computer science, business administration, marketing, and physical and social sciences. Based in Lafayette, California, Global employs a staff of 15 professionals. A listing of key staff for this project is provided in this document.

Electric Power Research Institute (EPRI)

EPRI is a nonprofit organization committed to providing science and technology-based solutions of indispensable value to our global energy customers. We manage a far-reaching program of scientific research, technology development, and product implementation addressing the entire spectrum of electricity supply, delivery, and applications.

EPRI's technical staff includes over 200 individuals who are experts in electricity generation, transmission, distribution, and end-use, as well as in associated issues such as energy system planning and environmental concerns. The EPRI Environment Division conducts a comprehensive program of research covering a broad range of critical climate change issues, including policy and economic analyses, impacts of climate change, and mitigation options. EPRI is well-connected with private-sector energy companies in the United States and internationally, with governmental agencies, and with bodies functioning under the UN Framework Convention on Climate Change (UNFCCC). Results of EPRI analyses and assessments-made widely available through peer-reviewed literature have been influential in U.S. and international policy deliberations.

Beyond climate change expertise per se, EPRI expertise in power generation efficiency, renewable energy and energy efficiency, and electric transportation is particularly relevant to the subject project.

Gas Research Institute (GRI)

GRI manages a comprehensive research, development and commercialization (RD&C) program for the natural gas industry. GRI's mission is to deliver high-value technology, information, and technical services to gas and related energy markets.

GRI's RD&C program has two main components:

- *A cooperative program* to deliver technology, services and information resources that can be widely applied to provide mutual benefits to the gas industry and consumers.
- *Commercial programs*, in which individual companies and consortia partner with GRI through investments to develop and deliver technology, services and information to meet business-specific goals that improve competitiveness and benefit customers.

GRI's staff of 175 includes scientists, engineers, researchers, business development and marketing, and sales professionals. Most are based at the company's headquarters in Chicago.

RESEARCH WORK AND PAPERS

- The United Nations Framework Convention on Climate Change - 5/1/98
- The Kyoto Protocol: A Summary of Key Issues - 5/1/98
- The Role of Developing Countries in Stabilizing Atmospheric CO2 Concentrations - 5/1/98
- Regional Impacts of a U.S. Carbon Tax

- The Value of 'Where and When' Flexibility - 5/1/98
- Overview of Climate Change Market Impacts in the United States
- Impacts of a Carbon Tax on U.S. Consumers
- Insurance Claims as an Indicator of Global Climate Change
- The Kyoto Protocol in the Context of the Long-Term Goals of the UN Framework Convention on Climate Change
- The Need for a Global Energy Technology Strategy - 3/1/99
- The Economic Costs of the Kyoto Protocol
- Potential Health Effects of Climate Change
- Energy Policy Integration and Coordination (EPIC): An Integrated Assessment of Air Quality Regulations and Global Climate Policy
- Carbon Mitigation & Sequestration

Gas Industry Gas Emissions Technology. This project seeks ways to: 1) optimize the U.S. natural gas system, electric and natural gas utility systems, and industrial/energy processes to minimize greenhouse gas emissions while reducing operating costs; and 2) transfer air emissions and gas loss reduction technologies to the gas industry. U.S. compliance with regulations to reduce emissions of greenhouse gases will require optimization of energy systems to minimize emissions while maximizing efficiency. Studies will address this optimization issue by evaluating: 1) potential changes to current natural gas industry operating and maintenance practices to boost efficiency while reducing emissions; 2) low-emitting technologies that take advantage of the inherent low carbon-to-hydrogen ratio of natural gas; 3) potential decreases in emissions and operating costs that would result from regionally combining electric and gas utilities; 4) systems that approach zero emissions by converting wastes to products, reducing transportation costs through better siting, or take advantage of synergisms that exist by co-locating interdependent industries.

EXPERIENCE

Promoting adaptation as an effective option for reducing the risks associated with climate change while minimizing need for costly, near-term interventions

Ongoing debates in global climate policymaking focus almost exclusively on one risk management option—near-term mitigation measures for reducing or offsetting greenhouse gas emissions. Such measures are apt to be expensive: Preliminary analyses of recent proposals such as those contained in the Kyoto Protocol suggest that the economy-wide costs of reducing CO₂ emissions in the near term could exceed \$100 billion annually in the United States alone.

Adaptation represents a promising risk management alternative that could limit the need for near-term mitigation measures, thereby minimizing disruption to society. Some adaptation to climate change will inevitably occur. Anticipatory adaptations—prudent, low-cost measures for adjusting social, economic, or ecological systems to decrease risks and potential impacts—could prove beneficial under current weather variability while

reducing future vulnerability.

For example, revised coastal zoning rules could prevent new development in flood-prone areas, while new weather-resistant crops could maintain agricultural productivity under changed conditions. EPRI studies indicate that adaptation could reduce the impacts to key economic sectors by billions of dollars.

Despite its promise and inevitability, adaptation has received insufficient attention from policymakers and research funding agencies, both domestically and internationally.

EPRI Strategy

The Climate Adaptation Initiative is designed to broaden global research to incorporate adaptation within the portfolio of risk management options being considered by climate policymakers.

The initiative, launched in 1999, is scheduled to continue through 2001. It includes outreach efforts within the scientific and policymaking communities, as well as continuing EPRI research focused on four topics: regional and local effects, market adaptation, ecosystem adaptation, and health effects. Deliverables will include knowledge and strategies to support development and implementation of effective adaptation measures and strategies.

In a major outreach effort, EPRI initiated and cosponsored a workshop with the U.S. Department of Energy, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, the National Science Foundation (NSF), and the John S. Heinz Center for Science, Economics, and the Environment. The goals of the workshop were to expand the discussion of climate change options to include adaptation and to catalyze the discussion of adaptation options among possible research funding agencies.

EPRI research activities and progress are described below for the following areas: regional and local, human health, and ecosystem impacts.

Because adaptation to climate change will occur at regional and local levels, it is necessary to understand the influence of rising atmospheric concentrations of greenhouse gases at these scales. Techniques are needed to "downscale" the outputs from general circulation models (GCMs) to the finer spatial resolution required for examining impacts at local and regional scales. Five statistical downscaling methods were evaluated in EPRI-sponsored studies, and the method deemed most reliable was adapted for use in forecasting hydrologic impacts in specific water basins. The method has been applied to conduct two multi-week simulations of observed climate extremes (historical droughts and floods in the United States) using seven regional climate models. Technical papers describing the results of this intercomparison were submitted to peer-reviewed journals. Multi-year simulations are currently under way with three of the regional models using downscaled GCM outputs for future "Business as Usual" and "stabilized CO₂ emissions"

scenarios as drivers.

With regard to human health, climate effects are both direct (e.g., heat stress) and indirect (e.g., through mosquito habitat changes). Most projections of how future climate change might affect health have not addressed adaptation, resulting in estimates of potential problems given no societal response. An EPRI project was initiated in 1999 to study the health effects of heat waves; climatologists predict that an increase in global temperature may be accompanied by an increase in the frequency of heat waves. This project will analyze the impact of heat episodes in selected major urban centers in northern and southern Europe, including London, Athens, Amsterdam, Stuttgart, and Stockholm. Results will inform national and international efforts to mitigate the health effects of heat episodes.

To improve knowledge of ecosystem impacts, EPRI has pooled resources with the National Aeronautics and Space Administration, U.S. Forest Service, and NSF to sponsor development of a new generation of dynamic global vegetation models (DGVMs). Previous models offer limited insight into the dynamic response of ecosystems to climate change. New DGVMs, in conjunction with existing state-of-the-art biogeochemical cycle models, are being applied to answer questions about how transient climate change may affect the vegetative structure, biogeochemistry, and carbon exchange properties of these systems. Scientific papers documenting the development and use of these models are being submitted to peer-reviewed journals.

By establishing adaptation as a viable option for reducing long-term risks associated with climate change, EPRI's initiative will lead to more informed national and international policymaking. This reduces the likelihood that unnecessarily stringent controls will be placed on near-term greenhouse gas emissions, potentially saving hundreds of billions of dollars for the U.S. economy alone.

The knowledge and adaptation strategies developed under this initiative could also yield huge economic benefits by enabling vulnerable market sectors worldwide to minimize potential impacts. In addition, these deliverables may underlie new business opportunities for companies that assist others in adapting to climate change.

Society will benefit from the development and implementation of informed policies and adaptation strategies that promise to cost-effectively reduce the economic, ecological, and human health impacts from climate change.

Key Personnel

The Global Energy Partners (GEP) International Team

Mr. Gregory A. Winkler – Project Manager and Principal: As director of Global's international business practice, Mr. Winkler conducts technical, economic and financial assessments related to the electric industry. His expertise addresses such contemporary industry topics such as electric industry liberalization and privatization, project

development and financial assessment, energy efficiency/DSM program planning and evaluation, environmental assessments and public/private partnership development. He has just completed a 19-month assignment as the resident planning advisor to the Electricity Generating Authority of Thailand. In that capacity, he advised EGAT on a number of policy issues related to Thai electric industry privatization, energy efficiency program development, monitoring and evaluation studies, long-range strategic planning, and energy service company market development. He has over 15 years of consulting experience working primarily with electric and gas utilities. Mr. Wikler holds a M.S. in Economics and a Master of Urban Planning, both from the University of Oregon, and a B.S. in Energy Economics from the University of California at Davis.

Mr. John Kotowski, Ph.D.—President Global Energy Partners: Dr. Kotowski has over 26 years experience managing and directing major technical support service contracts for commercial clients and government entities. He has been directly involved for the past 24 years in various energy related technical support and technology development/applications for electric and gas utilities and commercial/industrial clients. These efforts have focused on strategic management consulting, market assessment and development, energy and water management, environmental studies, and energy systems technology development and application. Dr. Kotowski holds a Ph.D. in Physical Chemistry from Boston College.

Mr. Ken Gudger - Chief Executive Officer Global Energy Partners: Mr. Gudger has extensive experience in all phases of the electric power industry. For over 15 years he held numerous senior management positions at Southern California Edison Company in Transmission, Substations, Distribution, Customer Service, and Energy Efficiency and Marketing. In 1991 Mr. Gudger assumed Executive leadership of Southern California Edison's Energy Efficiency program. As Vice President of Energy Efficiency his organization developed a reputation as a nationwide leader in the U.S.; receiving special recognition from energy customers, Washington D.C., and various special interest groups such as the National Resources Defense Council. After leaving Edison in 1996 he has provided advice and consulting services to those involved in the new and emerging unregulated American Electric Energy Industry. Early in 1997 he developed a paper on the newly emerging "Open Market Energy Customer (OMEC)" which described the restructured energy marketplace from the energy consumer's point of view. In September of 1997 Mr. Gudger gave testimony before the U.S. House Commerce Committee on the possible impacts that utility restructuring may present to the residential, commercial, industrial, and agricultural energy consumers.

Mr. Gary Hirsh - Vice President Global Energy Partners: For over 15 years, Mr. Hirsh has supported various technical assessments related to the energy industry. His past experience includes conducting policy marketing and branding assessments related to alternative fuel vehicles, electric motors, industrial processes, and urban renewable and resource sustainability. Prior to joining Global, he was the Assistant Director of the Washington State Energy Office and a Vice President for Macro International. He holds a B.S. from the Evergreen State College.

Ms. Patricia Hurtado - Senior Associate Global Energy Partners: Ms. Hurtado has over 20 years experience consulting to the energy sector. For the past nine years, she has conducted projects related to strategic planning, market evaluation, program design, implementation and performance assessment, energy conservation measures analysis, pollution reduction technology assessments, building analysis and engineering modeling, distribution and retail sector analysis, and privatization evaluation in the electric utility sector. Her consulting assignments have been conducted for clients both within the United States as well as abroad principally in Puerto Rico, Mexico, Columbia, Venezuela and Thailand. She holds a M.S. in Mechanical Engineering from Stanford University and is a registered Professional Engineer in the State of California.

Mr. Richard Milward - Senior Associate Global Energy Partners: Mr. Milward has over eight years experience in research, statistical and economic analysis of utility resource-related economic and technical data. He has particular knowledge and expertise in financial and economic cost analysis with a particular emphasis on industrial facilities. Industries with particular field expertise related to energy processes include wood products, industrial machinery, and health services. He has performed competitive rates analysis for electric utility clients including assessing potential competitors and their potential impact on the utility's market share. Mr. Milward has expertise in the economic, financial, statistical, and econometric analysis of electric utility data, including forecasting, feasibility studies, cost estimation, and resource valuation. He has considerable economic research and analysis experience related to the use of electricity and water resources and the associated economic impacts of resource utilization. He holds an M.S. degree in Agricultural Economics from the University of California at Davis.

Mr. Russell Goold - Analyst Global Energy Partners: Mr. Goold conducts technical assessments related to distributed generation technologies and urban waste management programs. Prior to joining Global, he was the integrated waste management specialist for the California Integrated Waste Management Board where he coordinated and managed jurisdictions on Board-issued compliance orders and identified performance gaps in waste reduction programs. He holds a B.S. degree in Environmental Policy Analysis and Planning from the University of California at Davis.

Mr. Neil Podkowsky - Analyst Global Energy Partners: Mr. Podowsky conducts economic assessments related to distributed generation technologies and open market customer technology assessments. He holds a B.S. degree in Economics from Washington University.

EPRl Team - Environment Division Team Members

Dr. Richard Richels- Dr. Richels directs global climate change research at EPRl in Palo Alto, California. In previous assignments, he directed EPRl's energy analysis, environmental risk, and utility planning research activities.

Dr. Richels received a B.S. degree in Physics from the College of William and Mary in 1968. He was awarded an M.S. degree in 1973 and Ph.D. degree in 1976 from Harvard University's Division of Applied Sciences. While at Harvard he was a member of the Energy and Environmental Policy Center and a consultant to the National Science Foundation and the Rand Corporation.

Dr. Richels has served on a number of national and international advisory panels, including committees of the Department of Energy, the Environmental Protection Agency and the National Research Council. Most recently, he served as an expert witness at the Department of Energy's hearings on the National Energy Strategy and testified at Congressional hearings on priorities in global climate change research. He was also a lead author for the Intergovernmental Panel on Climate Change (IPCC) Working Group III.

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Dick Bratcher – Mr. Bratcher serves as Manager, Global Climate, with responsibilities for strategic planning, operational management, technical communications, and project management.

Prior to rejoining EPRI in 1999, Dick was President of Science & Technology Management, Inc., a consulting firm specializing in analysis and communication of energy and environmental issues. His professional background includes a previous two-year term with EPRI, several years of service at Wisconsin Electric Power Company (culminating in assignments as Manager of Environmental Planning & Projects, and Manager of Research & Development), and several years working in R&D and special projects at the California State Water Resources Control Board.

Dick received a B.S. degree in Environmental Engineering (1974) and a M.S. degree in Environmental Health Sciences (1975), both from The University of Michigan. His research interests have spanned a range of energy/environmental issues, including water

quality, air quality, combustion waste management, acid deposition, and global climate change.

Dr. Kristie L. Ebi- Dr. Ebi is a Technical Manager of Health Studies in the Global Climate Change Business Area in the Environment Group. Dr. Ebi joined the group in 1997. Her research activities focus on the potential health effects associated with climate change. In addition, she is a Manager of Epidemiology in the EMF Business Area.

She has been with EPRI since 1993. Prior to that, Dr. Ebi was an Epidemiologist at Failure Analysis Associates, Inc. where she designed, managed, and interpreted epidemiological investigations of the cause(s) of adverse health effects resulting from the alleged action of drugs, chemicals, medical devices, and other agents in occupational, environmental, and residential settings. She resided in London, England from 1985-1990 where she conducted research in the Department of Environmental and Preventive Medicine at The Medical College of St. Bartholomew's Hospital and conducted post-doctoral research at the London School of Hygiene and Tropical Medicine. Her areas of research included chronic respiratory and cardiovascular diseases. Previously, Dr. Ebi was an Industrial Toxicologist with General Motors Corporation, and a Toxicologist with Equitable Environmental Health, Inc.

Dr. Ebi received her Ph.D. and M.P.H. in Epidemiologic Science from The University of Michigan, her M.S. in Toxicology from the Massachusetts Institute of Technology, and her B.S. in Biochemistry from Michigan State University.

Dr. Chuck Hakkarinen - Dr. Hakkarinen is the Technical Manager of the EPRI Environment Group. Currently responsible for projects addressing the atmospheric science aspects of climate change [including the internationally-funded ACACIA ("A Consortium for the Application of Climate Impact Assessments) and studies on weather and climate extremes and downscaling of GCM model outputs for regional scale analyses], plume downwash modeling, and seabreeze modeling. He also coordinates the development and publication of Air Quality Briefs for the Air Quality Health & Risk targets. He has worked at EPRI in various project and program management positions in the Environment Group and its predecessors since 1974.

He received the B.S. degree in Mathematics in 1971 and the M.S. degree in Meteorology in 1972 from the University of Maryland, and the Doctoral degree in Environmental Science & Engineering from UCLA in 1978.

He has authored or co-authored 12 technical papers on international acid precipitation monitoring, global climate modeling, and plume downwash modeling in conference proceedings and peer-reviewed journals, has served on U.S. government agency advisory panels on acid precipitation, on climate information issues, and organized in 1994 a regional climate model evaluation project and workshop for the Intergovernmental Panel on Climate Change (IPCC). He was a peer reviewer for the IPCC Interim Scientific Assessment on Climate Change in 1994 and the NOAA Climate Monitoring and Diagnostics Laboratory in 1997, and now serves on the NSF Climate Simulation Laboratory Allocation Panel and the NOAA Strategic Plan Advisory Committee. He was elected the initial Chair of the ACACIA Executive Board for 1997-1998, and his term has been extended by the ACACIA membership through 2000.

Mr. Larry J. Williams - Mr. Williams is a Manager working for the Global Climate Change Business Area at the Electric Power Research Institute (EPRI) in Palo Alto, California. The Climate Business Area, within the Environment Group, develops information, methods, and analyses, which help inform climate change policymaking and helps electric utilities manage the risks associated with the climate issue.

Dr. Williams has worked in a variety of areas at EPRI. Earlier work included research focussed on environmental and economic aspects of energy usage. Present work includes the integrated assessment of climate change policy proposals and the potential impacts of global climate change. This includes carbon cycle research as well as state-level economic impact analysis.

Prior to joining EPRI Dr. Williams taught physics at the University of Southern California, where he was also Assistant Director of the Energy Resources Laboratory. He was a National Fellow at the Hoover Institution at Stanford University in 1978 and a Visiting Scholar in the Department of Economics at Stanford from 1982 through 1984.

Dr. Williams holds a Ph.D. degree in Physics from Iowa State University. He also received a M.S. degree in Economics from the University of Southern California.

Dr. Williams is a member of the American Economics Association and the American Association for the Advancement of Science

Dr. Thomas F. Wilson - Dr. Thomas F. Wilson is a Technical Manager in the Global Climate Change Business Area in the Environment Group at the Electric Power Research Institute (EPRI) in Palo Alto, CA. His current research activities focus on a variety of climate-related issues: costs of alternative policies and the role of technology R&D in potentially reducing these costs, estimating the potential economic benefits derived from slowing or averting climate change (including market effects and ecosystem effects), exploring mechanisms for allowing flexibility in domestic and international climate policies (e.g., emissions trading, Joint Implementation and the Clean Development Mechanism), and providing information and methods to help electric utilities make decisions in the face of climate policy uncertainty.

Dr. Wilson joined EPRI in 1985 as a Project Manager in the Risk Analysis Program in the Environment Division. There, Dr. Wilson's activities focused on risk management for a variety of environmental issues (e.g., global climate change, acidic deposition, electromagnetic fields, air toxics and non-combustion wastes) and decision support methodologies (e.g., technology choice, siting, making decisions involving multiple objectives and multiple stakeholders).

Before joining EPRI, Dr. Wilson worked at ICF Incorporated, Stanford's Energy Modeling Forum and International Energy Program, and Brookhaven National Laboratory.

Dr. Wilson received a B.S. degree (1976) in Statistics from the University of North Carolina, Chapel Hill. He received his M.S. degree (1980) and Ph.D. (1981), both in Operations Research, from Stanford University.

Potential Research Topics

The following are a series of research topics the Global Energy Partner consortium would be interested in co-hosting a forum:

- Potential Health Effects of Climate Change
- State-Level Assessments of Climate Change Management Proposals
- Energy Policy Integration and Coordination (EPIC): An Integrated Assessment of Air Quality Regulations and Global Climate Policy
- Energy Policy Integration and Coordination (EPIC): An Integrated Assessment of Air Quality Regulations and Global Climate Policy
- Analyze the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity; and
- Analyze current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years."

Global Energy Partners, LLC

**Corporate Qualifications
Representative Clients**

March 1, 2000

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Global Energy Partners, LLC

"Meeting the needs of the rapidly changing energy industry worldwide"

CORPORATE QUALIFICATIONS

March 2000

Global Energy Partners, LLC (Global) was established in 1998 as a strategic alliance between three energy technology leaders: EPRI, the Gas Research Institute (GRI), and Daniel, Mann, Johnson and Mendenhall (DMJM). EPRI and GRI bring to Global world-renowned expertise in energy technology development and commercialization, energy market analysis, and energy use across all energy sectors. DMJM, one of the world's premier engineering construction companies, adds critical expertise in managing major public and private energy-related programs.

Through the acquisition of NEOS Corporation at the beginning of 2000, Global further enhanced its unique blend of talent, ability and perspective with NEOS' fifteen years experience providing technical and management consulting services to utilities, energy services companies, private industry, and government agencies.

A thorough understanding of both public and private sector operations enables Global to focus on workable solutions and implementation. This means not merely studying a client's problems, but offering innovative and technically sound solutions, and assistance in implementing those solutions. Global brings a fresh approach to the restructured energy industry – an approach that focuses on overcoming market barriers and making clean, efficient technology attractive to energy users.

Global Energy Partners enters the 21st century with a strong team and a strong mission – to provide a wide range of interrelated Market Transformation services that meet the needs of the rapidly changing energy industry worldwide.

The following pages provide a synopsis of Global's capabilities and representative projects, followed by a partial client list.

SOLVING LARGE ENERGY CONSUMERS CHALLENGES

- **Open Market Customer Analysis and Optimization**
- **Analysis and Optimization of Process Systems**
- **Recommendations of Customer Energy Choice Options**
- **Quality and Risk Analysis of Power and Energy Supply**
- **Facility Energy, Gas and Water Audits and Options**
- **Economic Analysis and Modeling**
- **Building Simulation and End-Use Monitoring**

Representative Clients and Projects:

EPRI

Open Market Customer Research Support

Global (NEOS) supported EPRI on their Open Market Customer (OMC) initiative. The OMC analysis methodology, which Global developed, is a new comprehensive way of looking at end-users or facilities total energy utilization costs. The method includes consideration of all forms of energy used on-site (i.e. gas, electric, liquid fuels, etc.) and encompassed all cost categories associated with energy utilization, including:

Energy Commodity

- Procurement
- Distribution Cost Factor
- Metering and Billing Costs

Energy Operations

- Energy Infrastructures
- Space Conditioning
- Process Systems
- Energy Monitoring and Management

Energy Finance and Administration

- Energy Systems Financing
- Energy Administration

For this project, both annual and capital costs were considered for each of these nine cost categories. As an initial part of the OMC analysis, a baseline case study was conducted to establish the annual and capital costs for each of these nine categories. To date Global has developed Baseline OMC Analysis Case Studies for eight major end-use segment customers: an airport, a major university, a large general hospital, a major industrial facility (wood products), a small retail outlet, a small school (K thru 12), a sit down restaurant, and a medium-sized planned residential community. Global developed a systematic analysis tool to allow an integrated optimization of potential energy efficiency improvements for these end-use areas.

Sempra Energy Solutions

FlexPrototyper

Under two successive contracts with Sempra Energy Solutions, Global (NEOS) created the FlexPrototyper, which is a software tool designed to assess load characteristics for specific commercial customers or prospective customers. FlexPrototyper is a building energy analysis tool that utilizes the powerful DOE-2 model in an easy-to-use Windows-based software platform. FlexPrototyper contains a database of over 200 building prototypes representing the majority of building types, vintages, equipment characteristics and geographical variations that represent commercial buildings. Once a building type is specified by the user, the program then selects the most appropriate weather file from its library of nationwide weather files. A unique energy simulation is then completed using the DOE-2 energy simulation program. After the simulation is completed, the results are then calibrated relative to the size of the building and the historic electric and gas billing information. Finally, results from FlexPrototyper are presented in both graphic format and comma delimited text format for use with load analysis software.

Electricity Generating Authority of Thailand (EGAT)

IRP Support —Data Development Demand-Side Management

Global is currently supporting EGAT in the development of baseline data required to prepare a demand-side management (DSM) plan. As part of the effort, Global will deliver to EGAT an easy-to-use energy analysis model based on the DOE-2 simulation algorithms, will develop baseline building characteristics for four residential and eight commercial building types, and will estimate DSM measure and program impacts.

Commercial New Buildings Program Design

Global (NEOS) developed a new buildings program design for this state-run utility. The work involved collecting data on 50 recently constructed buildings in the Bangkok metropolitan area, developing and running DOE-2 simulation models, and estimating building performance under maximum energy efficiency conditions. Global staff then designed the elements necessary for EGAT to implement and operate a new buildings program targeted to large commercial building projects in the metropolitan Bangkok region. Global also has developed design specifications for a new buildings energy efficiency demonstration project, to be implemented sometime in 1999. This project was funded by the World Bank under the auspices of the Global Environmental Facility.

California Energy Commission

Energy Efficiency Technology Energy Savings

Global (NEOS) conducted an assessment of energy and peak demand impacts associated with 200+ technologies and energy management measures in the residential and non-residential sectors of California. This project was conducted on behalf of the California Conservation Inventory Group, composed of members of all investor-owned utilities in California, several public utilities, research organizations, and environmental groups. Impact estimates were derived for three vintages of 16 commercial and two residential building types in five climate regions throughout the state. These impacts were derived in the form of annual energy savings, average coincident peak demand impacts, and load shapes (hourly profiles for 36 day types) resulting from the installation these measures in typical buildings. Results were obtained primarily by means of parametric simulations of a base case and measure case for a particular technology using typical building prototypes and the DOE-2.1E hourly simulation model. The results of this project are contained in a publicly available database called the Database for Energy Efficiency Resources (DEER) at the CEC.

Southern California Edison

Commercial/Industrial Summer DSM Incentive

Southern California Edison selected Global (DMJM) to design, market, and implement the DSM program in the Coachella Valley area. This project used rebates and incentives to encourage Coachella Valley residents and business owners to use energy-efficient electrical technologies.

The program that Global designed and implemented consisted of a marketing package for the commercial, industrial, agricultural, and residential sectors; a database system to track customer rebates and dealer incentives; a system for application processing and reimbursement; and analysis of program results to identify problems in program implementation and develop solutions.

Global developed a computerized system to track rebate and incentive amounts. Reports were designed to convey all the information that the client requested. Additional reports were designed to ensure proper processing of rebate applications and to meet the requirements of the Global accounting department. Using a real-time database system developed for this program, Global was able to provide a swift response when contractors made inquiries about their applications.

Global's market transformation program was successful. The results indicated that focused marketing and a well-planned and organized incentive system did encourage Coachella Valley customers to buy high-efficiency equipment.

Western Area Power Administration

Water and Energy DSM Assessment for the City of Marshall, Minnesota

For this project, Global (NEOS) developed water and energy conservation strategies for the Marshall Municipal Utility (MMU). Global staff and WAPA representatives visited three of MMU's largest industrial customers to determine appropriate water conservation measures. For MMU system, nine industrial and 44 residential and commercial water conservation technologies were identified as technically feasible in a preliminary screening report. MMU and the three industrial customers were asked to identify the technologies of most interest to them. Global performed a more detailed cost-effectiveness analysis on all the residential, commercial, and industrial measures selected by MMU and its customers.

Water/Energy Conservation Program Assessment, City of Lompoc, California

Global (NEOS) worked closely with the City to gather and verify historical water and energy consumption data necessary for a detailed benefit/cost and impact analysis of potential water/energy management programs. The analysis performed for this effort served to quantify existing conservation efforts, identify potential new conservation measures, and comply with State water management regulations. Global staff also provided training support to enable City staff to perform future analyses in-house. The feasibility study indicated that with the maximum scope the City could accrue savings of approximately 1,209 million gallons of water, 125,000 MBtu of natural gas, 3,600 MWh of electricity, and over \$937,000 in energy costs on an annual basis. Maximum water savings of over 60% were calculated in comparison to the base year consumption estimate, with a benefit to cost ratio of 3.5.

Packaged DSM Program Development

In a joint project with WAPA, Intermountain Consumer's Power Association (ICPA), and the City of St. George, Utah, Global (NEOS) conducted an energy efficiency technology assessment of commercial facilities for the development of packaged DSM programs. Under the first of a series of projects, Global developed a list of energy efficiency options for the restaurant sector for evaluation through application to an existing full service restaurant in St. George. This project included the following components: 1) a detailed energy audit of the restaurant facility; 2) installation of MicroDataLogger Portable Data Acquisition System units on specified end-use circuits in the building; 3) analysis of the audit and monitored data; and 4) preparation of a detailed energy audit report for the facility, which identified potential energy efficiency measures applicable to the site.

Building Monitoring Assistance for State of California, Dept. of Corrections

Global (NEOS) provided building monitoring assistance to the State of California Department of Corrections. This assistance was designed to help Folsom State Prison determine energy use profiles for the two prisons at the site, determine energy usage by the Prison Industries, and determine energy savings from the installation of energy using equipment. To accomplish these tasks, Global installed load monitoring equipment where appropriate to collect the needed data. Global then analyze these data and prepared a final report on their findings.

Oglethorpe Power Corporation

Geothermal Heat Pump Demonstration Project

To assist Oglethorpe in increasing the market share of geothermal heat pumps among its 39 member cooperatives, Global (NEOS) developed a computer program that tracks the progress of marketing leads. In the past, Oglethorpe collected the names of individuals interested in residential geothermal heat pumps and then distributed these leads to its member cooperatives based on where the resident lived. Follow-up was difficult and very few leads resulted in installations. With this software, Oglethorpe can distribute the leads electronically, then track them through periodic report requests to its member cooperatives. Approved heat pump installers also receive these leads, which increases the likelihood of follow-up and installation.

University of Maryland

Long-Range Energy Planning

Global (DMJM) performed a comprehensive technical study of the University of Maryland's energy use patterns. The study resulted in recommendations for improving efficiency while reducing costs. The energy conservation alternatives recommended by Global resulted in savings of more than \$1.3 million in annual utility costs. The evaluation consisted of a detailed survey, study, and modeling of 10 typical facilities representing the diverse energy distribution channels and end uses on campus. The university has more than 200 buildings on its College Park, Maryland, campus, with a gross floor area in excess of 9 million square feet. Global was able to take the information from the 5 percent analysis model to develop an overall campus energy conservation strategy. Separate analyses were performed on the central steam plant and the satellite utility buildings.

The final recommendations were a blend of technical and management solutions providing for ongoing monitoring, improvements, and revisions. Global's recommendations, which would reduce energy consumption by approximately 13 percent, included improving operations and maintenance practices, optimizing occupancy schedules and use of building areas, installing high-efficiency motors, and installing timers on domestic water pumps. Global identified energy savings from all sources (electrical, natural gas, and steam) totaling 58,900 MWh.

Potomac Electric Power Co. (PEPCO)

Construction Management/Commissioning: Energy-Efficient Retrofits

Global (DMJM) developed and implemented a comprehensive set of project controls and procedures. This included a computer-based cost control and estimating system; program and project-specific CPM schedules; design review procedures; bid and award evaluations; and a construction administration program. An executive committee was organized to handle routine action items,

critical issues, and organizational interaction to facilitate the initiation of a new operating department within PEPCO.

Global conducted a value-engineering program to produce savings in both construction costs and installation time. In developing project controls and procedures, Global was responsible for conducting energy evaluations; developing programs; collecting information, including public input; and reviewing programs.

Bangkok Produce

Investment Grade Energy Audit/Financial Analysis

Under subcontract to Excellent Energy International (EEI), Bangkok, Global assisted EEI with the technical evaluation and quality assurance for developing a guaranteed performance contract to Bangkok Produce merchandising Public Company Limited (BKP), Thailand. BKP uses nearly 38,000,000kwh of electricity annually. Through their Investment Grade Energy Audit and Financial Analysis Global and EEI identified 4 energy efficiency measures and a cogeneration opportunity resulting in a total savings of 12%. The World Bank provided a grant to conduct these studies through the local utility EGAT. The plant owners are currently in the process of approving the installation.

Confidential Client

Industrial Cogeneration, Oyster Bay, New York

Global (DMJM) evaluated the prospect of using an onsite cogeneration facility to improve reliability and reduce energy costs at the client's copper plating facility in Oyster Bay, New York. Designed to operate 24 hours per day, seven days a week, the facility was experiencing reduced operating reliability as a result of its reliance on a single electric power source. Anticipated increases in electric power costs were an additional concern. Issues addressed in Global's screening study included cogeneration requirements, projected heat and electrical use characteristics, permitting constraints, siting constraints, and economic benefits.

Global first assessed existing and future plant loads, determining that combined space heating and process demands would require a total future peak demand of 6.2 MW. Alternative cogeneration configurations and equipment were then evaluated for performance, energy efficiency, thermal energy utilization and disposal, and other special considerations. Permitting and siting issues were also examined to assess the permitability of the project and to ensure the availability of a suitable site. A detailed economic evaluation of the alternatives was performed using Life Cycle Cost (LCC) analysis to examine the annual difference over 20 years between monies spent on electricity and natural gas and the monies spent to operate the cogeneration system.

MINIMIZING ENVIRONMENTAL IMPACTS OF ENERGY USE

- **Optimum Source Fuel Analysis and Recommendations**
- **Minimization of Energy Air Quality Impacts**
- **Water Quality Technology Choice Recommendations**
- **Total Energy Environmental Facility Assessment**
- **Distributed Resource Analysis and Optimization**
- **Economic/Energy/Environmental Analysis**
- **Market Research and Plan Development**
- **Program Planning and Project Development**

Representative Clients and Projects:

Electric Power Research Institute

Lessons Learned: Designing Successful Green Power Services Programs Global Energy Partners

Under this current effort, Global Energy Partners is developing a detailed assessment of the various Green Power Services programs presently being offered by Electric Service Providers, Power Brokers, and a few utilities throughout the U.S. The assessment will define the services offered, their pricing structure and describe the various entities different market strategies. The assessment will also entail an evaluation of the financial variables of each program analyzed. The results of these efforts will be formulated into a concise Green Power Services "Best Practices."

National Aeronautics and Space Administration

Development of Renewable Energy and Water Efficiency Procedures Manual

As a subcontractor to the National Renewable Energy Laboratory, Global (NEOS) developed a comprehensive Procedures Manual for NASA facility energy managers on renewable energy and water efficiency applications. The purpose of these documents was to provide NASA energy managers with a framework for the feasibility analysis, design, and installation of renewable energy technologies and water conservation measures. Particular detail was incorporated into these manuals with respect to specific renewable and water efficiency technology costs and savings, and analysis methods for calculating lifecycle costs and payback periods. The document was distributed to all NASA facilities as part of NASA's efforts to comply with Executive Order 12902.

Mpumalanga, South Africa

Global (NEOS) staff conducted a feasibility study of developing an off-grid, rural electrification program to meet the objectives of the South African government. During the trip, Global staff met with numerous government, industry and utility personnel; visited villages that were candidates for a pilot project; and gathered information on the rural electrification efforts and infrastructure of South Africa. As a result of the trip, the South African government and U.S. DOE agreed to fund Global to work with stakeholders to develop a PV-based energy services pilot-program for Mpumalanga.

U.S. Department of Energy - Commercialization Ventures

This project was a commercialization effort focused on aggregating electric utility demand for PV-powered water pumping systems used in PV service programs. The unique PV-powered pumping system will operate conventional ac pumps rather than relying on the more expensive and less reliable "PV pumps" on the market today. This market aggregation will be accomplished by 1) developing formal commercialization strategies ideally suited for electric utilities serving remote water pumping customers; 2) supporting the installation of pilot PV pumping systems at 25 utilities that presently have pilot PV service programs in place; 3) developing strategic alliances with these utilities to assist with the implementation of full-scale PV service programs; and 4) initiating market penetration by aggregating utility demand with a goal of creating 250 utility purchases per year.

Golden Photon, Inc.

PV Water Pumping System Development

Global (NEOS) provided consulting support to Golden Photon, Inc. to develop a PV power supply to operate conventional ac submersible pumps that require motors ranging in size from 1/3 hp to 2 hp. The power supply consists of Golden Photon's PV modules and an inverter designed specifically to operate the motors (both single-phase and three-phase, 240 VAC) that are typical for these pumps. By operating "off-the-shelf" submersible ac pumps, many existing barriers to widespread commercialization of PV pumping in the US will be removed. As part of this product development and commercialization effort, Global designed, constructed and operated an on-site water pump test facility. The objective of this facility was to test various combinations of motors and pump ends (AC powered submersible centrifugals) to be offered by Golden Photon in their packaged system. Global

researched various means of testing pumps, developed the test plan, designed the hardware and data acquisition equipment, wrote the computer testing software, constructed the test apparatus, and operated the laboratory. As a result of the testing, Global documented a complete set of empirical pump curves for all combinations of pumps to be offered in Golden Photon's packaged systems. This information is now used for system sizing and design calculations for their product.

Western Area Power Administration

Technical Assistance to Navajo Tribal Utility Authority (NTUA)

To address the need for electrification at remote sites on the Navajo reservation, Global (NEOS) worked collaboratively on a project with NTUA, Sandia, and Western to provide PV-powered electric service to off-grid residences on the reservation. The estimated 2,000 to 10,000 installed solar units could create the largest off-grid PV system in the United States, providing significant support for future system sales, service, and research. Global developed PV service guidelines for the utility and supported the specification of standardized PV packages that NTUA will provide.

National Park Service

Acadia National Park

Global (NEOS) was involved in a three phased study to determine the potential of PV supply options for the National Park Service. Under the first phase, Global compiled a database of all facilities within the Park using radio transmission equipment, and the power needs associated with each facility. In addition, Global developed estimates of future power needs associated with each of these facilities. Global conducted energy audits of the Park's summer use facilities to determine existing and future power requirements of these facilities, and also performed analyses to determine energy efficiency and fuel switching opportunities for these loads.

Under phase two of this project, Global performed an evaluation of PV and PV/hybrid options as power supply alternatives to a utility line extension. This evaluation included the sizing of all major components for each option, assessing the physical locations of the proposed installations, identifying and quantifying potential environmental impacts for each option, and providing a design analysis with design criteria for component sizing and life cycle costing for each option. Based on the above evaluations, Global provided the Park Service with a preferred alternative, and provided a schematic design system specifications for the this option.

Under phase three of the project, Global conducted a life cycle cost analysis of the selected alternative, using the Department of Energy's BLCC4-95 program, to compare the selected alternative to line extension and electrical conductor replacement alternative.

National Renewable Energy Laboratory

Presidio of San Francisco Solar Electric Vehicle Charging Station Project

Global (NEOS) designed, specified and constructed a PV demonstration system to charge one or more electric vehicles at the Presidio of San Francisco. The steps required to deliver a final system design and system installation included: 1) Data Gathering, 2) Site Visits, 3) System Design,

Specifications and Approval, 4) Cost Estimate, 5) Project Coordination, and 6) Installation Supervision. This successful project has become a significant example in the Park Services "Renew the Parks" initiative.

Lignocellulosic Feedstock Resource Assessment

The Department of Energy's Office of Fuels Development supports research to develop technology that converts the cell walls of plants into ethanol for use as a transportation fuel. Much of the research is conducted by the Biofuels Program at the National Renewable Energy Laboratory (NREL). Through a competitively won contract with NREL, Global (NEOS) performed a national resource assessment of 12 different lignocellulosic biomass resources. The purpose of the project was to produce a resource document and companion GIS database that shows the distribution, amounts, availability, alternative uses, and current values of the target feedstocks in the United States.

State of California, Department of Fish and Game

Background Report on Applicability of Biodiesel Fuels for Use in Diesel Electric Locomotives

Global (NEOS) produced a confidential report on the technical and regulatory issues associated with the production and use of a potential supplementary or replacement fuel for diesel locomotive engines: biodiesel fuels. Responding to environmental clean up concerns after a major rail accident, the Department of fish and Game asked Global to provide background information on biodiesel fuels. The intent for this effort was to assess whether there were significant technical obstacles to the use of biodiesel fuels in diesel electric locomotives.

U.S. Department of Energy, Western Regional Biomass Energy Program

Cotton Gin Trash in the Western United States: Resource Inventory and Energy Conversion Characterization

Global (NEOS) completed a resource inventory and energy conversion characterization for cotton gin trash in the western United States. The study explored the increasing problems of disposing of wastes associated with cotton processing. Traditional disposal methods, such as open-air incineration and landfilling are no longer adequate due to environmental concerns. The study evaluated the technical, economic and environmental feasibility for cotton gin trash to serve as an energy resource. As part of

the study, cotton gin trash was quantified, by county, in the five cotton-growing states of the western United States. An economic evaluation model was developed that allows gin operators to analyze their own situation to determine the profitability of converting cotton gin trash to energy. Another result of the study is a technical evaluation of the technology that appears to offer the most promise of converting cotton gin trash to energy--gasification.

Economic Impact of the Use of Biofuels in the WRBEP and GLRBEP Regions

Global (NEOS) conducted an analysis of the economic impact of the use of biofuels in the WRBEP region. These economic assessments use methodologies similar to, and compatible with, previous and ongoing studies for both the Northeast and Southeastern Regional Biomass Energy Programs. The assessments derive the direct and indirect economic impacts of biofuel usage. The analysis was conducted in two phases. Phase I covered the production of ethanol fuel from all organic materials, especially corn and other grains. The assessment includes the operation and maintenance of ethanol production facilities (including by-products), as well as farm income and associated impacts. In addition, Phase I also assessed the impact of wood fuel in the wood products, the pulp and paper industries, and utilities.

Colorado Governor's Office of Energy Conservation

Colorado Renewable Resource Database (CORRD)

Global (NEOS) recently compiled a major compilation of solar, wind, and climate data for the state of Colorado in a format usable for the design and build community. Colorado Renewable Resource Database (CORRD) is a unique and powerful mechanism for accelerating the commercialization of renewable energy technologies in the state. It places comprehensive, high quality data sets on individual users' desktops to facilitate project planning, policy analysis, and energy research efforts. Now available on the Internet, via the World Wide Web, the COORD site delivers geographic information data sets and a viewing platform. This data also represents a template for adoption by other states, regions, or utility service territories.

U.S. Department of Agriculture, Forest Service

Colorado Front Range Forest Health Partnership, Forest and Urban Wood Resource Assessment

Global (NEOS) performed a resource assessment of woody biomass resources located in both a forest setting as well as in an urban environment. The forest resource assessment was performed for national forest lands as well as for state and private lands. The effort provided an initial estimate of wood that may be available for energy purposes to further forest health initiatives. The urban portion of the resource assessment addressed multiple sectors including primary and secondary wood processors, urban tree residue generators (i.e., tree care firms, utility line maintenance operations, lawn care firms, municipal governmental units, park and recreation departments), wood recyclers, trash haulers, and construction and demolition sources.

Biomass Co-Firing in the Four Corners Region

Global (NEOS) performed an assessment of the potential for biomass co-firing in the Four Corners Region of Colorado, New Mexico, Arizona, and Utah. The analysis was conducted with specific regard to a unique U.S. Forest Service activity, the Ponderosa Pine Zone Project, which is designed to restore forest health. One portion of the PZP will make available considerable quantities of non-merchantable timber. Global personnel evaluated the potential for using this biomass resource as a fuel source in regional coal-fired power plants. Original data were collected on the cost of chipping and transporting biomass resources, operator interviews were conducted with three major power plants (Four Corners, San Juan, and Tri-State (Nucla), and initial assessment of biomass potential was evaluated.

Los Angeles Department of Water and Power

Review of Performance Feasibility of Proposed Harbor Wind Energy Project

The Los Angeles Department of Water and Power (LADWP) has maintained an active interest in promoting utilization of renewable resources, including wind energy options, in its service territory. An outside party submitted a proposal to LADWP to provide sponsorship of a wind power plant on the San Pedro Breakwater in Los Angeles Harbor. LADWP contracted with Global (NEOS) in 1993 and 1994 to provide technical assistance in reviewing the proposal, including a technical review composed of research on other similar projects and an independent calculation of energy production by the proposed wind plant.

Global staff concluded that the proposer overestimated potential power production, failed to account for potential wake losses, did not take all available sources of local data into account, and that there was tremendous uncertainty in their performance estimate. Global recommended that an anemometry program be implemented on the breakwater to address the lack of site specific data, that the proposer refines the plant performance estimate using additional data sources and models the wake loss effects. Global also developed a performance data checklist approach for LADWP to use as a guide for future wind project proposers.

Southern California Edison Company (Edison)

Wind Turbine / Battery Storage Project

Global (NEOS) staff were involved in a test of a battery storage system dedicated to the output of Edison's 50 kW DAF Indal VAWT. The purpose of the test was to quantify the incremental costs and benefits of such a storage system in a wind energy context. Global was responsible for software development, quality assurance, field work, data analysis and reporting. The project involved the development of two major software applications; SCESTOR was developed to simulate Edison battery systems, and BATMAN was developed to manage all of the remote battery system control and data acquisition, including safety and housekeeping tasks associated with a 240 kWh capacity battery subsystem. The SCESTOR model is described in "Parametric Modeling of the Effectiveness of Energy Storage Applied to Regional Wind Park Energy Production", published in the conference proceedings for WindPower '87. The test design was published in "Description and Performance of Southern California Edison's Battery Storage/Wind turbine System" at the Ninth ASME Wind Energy Symposium. Final test results are available through Robert L. Scheffler at Edison.

Assessment of Power Purchase Curtailments in the Tehachapi Wind Park Area

Global (NEOS) performed an internal study for Edison which evaluated the effects of power purchase curtailments in the Tehachapi area. Global staff quantified the resultant energy and revenue losses, and projected future losses, based upon a project-by-project review of performance and curtailment history. Recommendations were made by Global regarding the optimization of curtailment methodologies. In the study, Global identified the need for a 4, 12, and 24 hour wind energy forecasting technology in order to increase the capacity value of the resource.

The Navajo Tribal Utility Authority

Resource Plan Development

Global (NEOS) developed the electrical resource plan for the Navajo Tribal Utility Authority (NTUA). For this effort, Global utilized the existing demand forecast and customer surveys already in existence for NTUA. Results from customer surveys were linked to the load forecast results along with a database of energy efficiency measure impacts to identify energy efficiency resource potential. The Global developed model DSM-RAM was used for this purpose. This DSM potential, along with information on conventional supply resources and alternate energy resources was placed in a resource optimization model to identify the least cost resource mix for NTUA. Global presented technical results at four public meetings in order to receive input into the process. Adverse environmental impacts resulting from a particular resource mix were identified. Global then developed the two and five year action plans, as well as a measurement and verification plan.

Multiple Clients

Glass Melting Program

In Southern California, the glass industry must reduce its NO_x emissions by 90%. This would have been nearly impossible without technologies developed by Global (GRI). Glass melting accounts for 5-6 percent of Southern California Gas (SoCal Gas) Company's throughput, so it represents a significant energy user and customer for SoCal Gas. Global (GRI), with its partners, developed a multipronged approach to providing the glass market with the necessary tools to tackle the challenges of emissions compliance, productivity, and product quality, with minimal effect on the glass industry's pocketbook. Global (GRI) has helped to develop two technologies designed to lower NO_x emissions to within regulatory limits and, most importantly, at a lower cost than other NO_x-reduction technologies. The technologies – Oxygen-Enriched Air Staging (OEAS) and Gas Reburn – have been demonstrated on both endport and sideport glass furnaces with excellent results. These technologies have currently been applied to the container glass industry, with tests expected to confirm their applicability to flat glass as well. OEAS has been reducing NO_x by 40-60 percent during tests on endport and, more recently sideport, furnaces. It costs about \$1/ton of glass produced to add OAES to an endport furnace; that translates to a pollution abatement cost of about \$400/ton of NO_x reduced. Other staging options, including compressed air or blower air rather than pure oxygen, bring the overall cost premium down to \$.40/ton of glass and abatement costs down to \$200/ton of NO_x removed.

Desiccant Dehumidification

Desiccant dehumidification is commonly used in the industrial market sector for moisture-sensitive manufacturing processes and humidity controlled storage applications. Recent success has been made

introducing these products into buildings with refrigeration processes that generate economic benefits from introducing drier air. In the supermarket segment, seven of the top 50 supermarket chains now specify desiccant dehumidification for their standard store designs, and over 1,200 desiccant systems, representing an approximate 4% market penetration, have been installed. One factor leading the expansion of desiccant dehumidification from early niche markets such as supermarkets, ice arenas, and refrigerated warehouses into the mainstream is indoor quality (IAQ) requirements. In today's commercial marketplace, IAQ equates directly to outside air quantity as prescribed by the 1989 version of ASHRAE Standard which nominally tripled outside air requirements over the 1981 Standard in response to the "sick building" syndrome of the 1980s. Requirements for large streams of outside air make humidity control problematic especially in humid climates. Consequently, the marketplace is entering a critical period when manufacturers, equipment specifiers, and end users will determine what solutions are cost-effective to address their IAQ and humidity control problems. Given this opportunity, Global's (GRI's) Desiccant Cooling Program has developed a multi-pronged strategy in conjunction with GRI member companies, the U.S. Department of Energy (DOE), and end use customers to develop sustainable commercial market growth, which includes: best practices guidance, screening tools, installation case studies, standards and codes support, and awareness building, education, and training.

TRANSFORMING THE ENERGY MARKETPLACE

- **Market Research**
- **Market Assessment and Segmentation**
- **Energy Efficiency Program Development**
- **Program Implementation and Operations**
- **Program Evaluation and Critical Analysis**

Representative Clients and Projects:

Electricity Generating Authority of Thailand

Load Research Program – Demand Side Management

The Electricity Generating Authority of Thailand (EGAT) has contracted with Global (EPRI) to study electricity usage in Thailand. The study, which is being conducted in Thailand using equipment developed by Global, is financed by the World Bank from its Global Environmental Facility. The study findings will enable EGAT to understand usage patterns of electricity throughout Thailand, and as a result, to design programs to increase efficiency and thus reduce greenhouse gas emissions.

Central and Southwest Corporation

Measurement & Evaluation Protocol Development

This project was to develop measurement and evaluation protocols that will guide Central and Southwest's (CSW) efforts to evaluate its new generation of energy efficiency programs. Areas of focus included a review of protocols from other regions of the country: New England, New Jersey, California, U.S. DOE, National Association of Energy Service Companies, and Boston Edison. The project also involved establishing evaluation guidelines for specific proposed CSW DSM programs.

Diné Power Authority (DPA)

Market Assessment for Navajo Transmission Project

Global (NEOS) was retained by DPA to perform an analysis of the current market conditions for a potential merchant transmission line in a specific corridor in the Southwest. Uncertain and changing market conditions required the use of novel techniques to evaluate the economic potential for a non-rate-based transmission line. Global's approach included extensive surveys of major power users including investor-owned and public utilities, power marketers, independent power producers, and large end-users. Concurrently, a competitive assessment was performed to contrast the market price or transmission with posted transmission tariffs, and to determine available capacity on alternative transmission paths, and an identification of physical and economic transmission constraints. The implications of FERC Rules 888 and 889 were included in this evaluation process. Global also assisted DPA in evaluating additional project opportunities related to the NTP.

Ontario Hydro, Northern States Power & Northeast Utilities

Market Assessment of Medical Waste Electrotechnologies

Global (NEOS) developed a comprehensive technology and market assessment of 25 promising medical waste electrotechnologies that have direct applicability to the medical community including hospitals, clinics, extended care facilities, and medical offices. This multi-client study includes two phases. The first phase was a jointly sponsored technology assessment that addressed the engineering characteristics of many promising medical waste electrotechnologies and assessed the impact of replacing old less efficient fossil-based waste disposal options. Phase II was to work individually with each participant to develop a tailored market assessment that can be used by the utility for strategic planning and program development purposes.

U.S. Department of Energy, Western Regional Biomass Energy Program

Technical, Economic and Regulatory Evaluation of Biomass Utilization Options in the Lake Tahoe Basin

Over the past several years, forest health in the Lake Tahoe Basin and eastern Sierra Nevada mountains has declined severely due to long-term drought and infestation of beetles and other diseases. Global (NEOS) was retained to assess biomass energy markets for non-merchantable material located on national forest lands. For this work effort, Global personnel performed a forest inventory and resource assessment of the Lake Tahoe Basin. The project also entailed an assessment of regulatory conditions affecting biomass energy development and an analysis of potential energy markets for biomass material.

Lake Tahoe Green Power

In a follow-up to the *Evaluation of Biomass Utilization Options in the Lake Tahoe Basin*, the Department of Energy's Western Regional Biomass Energy Program selected the Nevada Tahoe Conservation District (NTCD) to develop a green power program using Lake Tahoe Basin biomass as the fuel source. Global (NEOS) worked with the NTCD to evaluate consumer willingness-to-pay for electricity generated from materials collected through forest restoration efforts in the Lake Tahoe Basin. In addition, Global documented the procedures for and transaction costs associated with completing a green power tariff filing with the California Energy Commission. Global investigated interconnection and transmission costs associated with wheeling green power within the Lake Tahoe Basin and into regional electricity markets. This study determined whether a green power marketing program could encourage biomass electricity market development in the Lake Tahoe Basin, while helping forest restoration efforts.

Commercial Gas Cooling Program

Global (GRI) has significant market transformation experience introducing commercial natural gas cooling equipment to the marketplace. Global's long-standing Commercial Gas Cooling Program has been successful in achieving a sustainable market niche for absorption and engine-driven chillers fueled by natural gas, despite the significantly higher first cost of this equipment when compared to conventional competing equipment. The Cooling Program has been an industry-wide program involving closely coordinated efforts with the American Gas Association (A.G.A.), The American Gas Cooling Center (AGCC), GRI member companies, and manufacturing partners. As a result of this program, natural gas cooling sales have increased from 4% of all chiller sales in 1990 to nearly 9% in 1997 under declining capital budgets.

SUPPORTING ENERGY EDUCATION AND TECHNICAL TRAINING

- Energy Efficiency Support Services
- Seminar and Conference Planning and Presentation
- Curriculum Development
- Marketing and Evaluation
- Technical Transfer Activities

Representative Clients and Projects:

Since its inception, Global (NEOS) has planned, developed, conducted, and evaluated hundreds of seminars, workshops, meeting and conferences across the United States. Global's training programs are customized to meet the technical education needs of a variety of professionals, including utility field personnel, power engineers, customer service staff, general managers, members of boards of directors, business and community leaders, and government officials. The following are a representative sample of the variety of training programs Global has provided:

Los Angeles Department of Water and Power (LADWP)

LADWP Customer Conference

Global (NEOS) was retained by the Los Angeles Department of Water and Power (LADWP) to develop, coordinate, and participate in a one-day customer conference targeted to LADWP's largest commercial and industrial customers. The purpose of this conference was to provide commercial and industrial customers with a clear picture that LADWP will remain a leading supplier of energy services, now and into the deregulation of the electric utility industry.

Western Area Power Administration

Grand Canyon Sustainable Design Charette

Global (NEOS) coordinated and managed a Charette co-sponsored by Western Area Power Administration's Salt Lake City Area Office, the National Park Service and the Army Corps of Engineers Construction Engineering Research Labs. The purpose of the Charette was to generate ideas for developing sustainable solutions for Grand Canyon National Park in the areas of energy efficiency, transportation, air quality, crowding, use of natural resources, safety, water use, waste water, and buildings. There were two main components to the Charette: (1) establishing a design group working session and (2) taking ideas from the design team sessions and presenting them at a public forum. Besides developing the Charette program, Global also coordinated hotel and meeting rooms for the participants and public, set up several tours for the participants, arranged travel for all participants, negotiated participant honoraria, and produced and distributed a daily newsletter to participants and public. Global completed this task on-time and under budget to the acclaim of Western, the Army Corps of Engineers, the National Park Service, and the Charette's participants.

Resource Planning Training Series

Global (NEOS) coordinated and developed a series of comprehensive Integrated Resource Plan (IRP) training programs. The Energy Policy Act of 1992 requires all Western's customers to develop an Integrated Resource Plan (IRP) and submit it to Western for approval. This program, which consisted of three-day workshops given in multiple locations, focused on providing training to Western's customers to meet the EPAMP IRP requirements through sessions on methodologies and concepts and training related to applicable tools and models. The workshops were designed to lead the attendees through the IRP development process step-by-step. The topics were highlighted by case studies and hands-on working sessions developed by Global to familiarize attendees with the IRP development process by having them work through a sample IRP. Global developed the agendas for the series, contacted and scheduled all the speakers, accumulated biographies and presentation materials for all speakers, made travel and lodging arrangements for speakers, and analyzed the attendees evaluation responses. Global moderated the workshops and provided presentations on DSM, load forecasting, and environmental considerations.

Energy Responsiveness Design Seminar

The purpose of the seminar was to provide a mechanism to establish effective communication among groups and individuals responsible for designing and constructing commercial buildings. Due to the current conflicting desires and goals between these groups within the building industry, the majority of buildings currently designed and constructed are not energy efficient. To reverse this process, the input of architects, engineers, building managers (including maintenance personnel), commercial lenders, developers/investors, and others was sought. The meeting revealed the basis of current building trends and sought solutions to bring about change. As a result of the meeting, several utilities along the Front Range are actively uniting various building industry representatives to initiate an open dialogue with the goal of designing and constructing energy efficient buildings within the utility's service territory. Global (NEOS) developed the seminar agenda, constructed the list of attendees, made all facility and logistical arrangements, and facilitated the seminar.

Distribution Maintenance Workshop

Global (NEOS) produced this one-day workshop for utility distribution maintenance personnel, electricians and technicians, power quality consultants and engineers, and facilities managers. Global's duties included developing the workshop agenda, identifying speakers and arranging speaker travel and lodging, producing the speaker's presentation materials, making logistical and facilities arrangements, and supervising on-site staff and activities. Typical of Global's workshop presentation efforts was its successful fulfillment of the workshop speaker's complex multi-media audio-visual equipment requirements. Workshop topics included methods of improving maintenance self-reliance through periodic substation maintenance; current testing and troubleshooting practices; using infrared scanning in preventative maintenance; and the measurement and examination of electromagnetic fields. In addition, there were two breakout sessions: (1) high voltage electrical testing and maintenance practices and (2) low voltage power quality.

Motors & Drives Audit Training Seminars

Global (NEOS) conducted extensive motor audit workshops for electric utilities which provided participants with a motor overview, motor audit procedures, and equations to calculate the savings associated with replacing a standard motor with a high efficiency motor. Besides learning about motor auditing from lectures, each participant used motor auditing equipment to perform a hands-on motor audit. In addition, participants used data they collected to calculate the energy savings associated with replacing a standard motor with a high efficiency motor. The participants overwhelmingly describe the workshops as a success and indicated that they were going to use their new knowledge and experience to perform motor audits for their customers.

Utility Negotiations Workshop

Global (NEOS) planned a one-day workshop aimed at helping attendees learn how to negotiate with customers to get the best deal for the utility. Co-sponsored by the City of Anaheim, there were presentations on the effects of the competitive market on municipal utilities and the advantages of key accounts programs and how to set up a key accounts program. Global developed the agenda and brochure, secured key speakers and made their travel and lodging arrangements, compiled and assembled the session workbooks, and coordinated all logistical and facilities needs.

Colorado Commercial Building Audit Workshop

Global (NEOS) conducted a three-day workshop for Western Area Power Administration's Loveland Area Office customers based on a commercial audit workshop curriculum developed by Global under a separate task order. The first and second days of the workshop covered the fundamentals of energy auditing, and day three provided hands-on field audit experience at a co-host facility. In developing and coordinating the workshop, Global worked closely with LAO personnel to finalize the agenda and design target audience(s); secure co-host utilities; and coordinate all other logistics Global also provided the workshop instructor and on-site staff.

International Society of Arboriculture

Urban Tree Residues: New Opportunities and Solutions

Global (NEOS) conducted two separate workshops on the topic of urban tree residue. The purpose of the workshops was to discuss the growing concerns of the generation and disposal of urban tree residue. Global's responsibilities included: all logistics (i.e., facilities, handout materials, hotel, agenda, audio-visual equipment); speaker coordination; publicity; creating and mailing brochures, organizing tours; and making presentations. Global worked closely with several sponsors in coordinating these workshops. The sponsors included: The International Society of Arboriculture Research Trust; USDA Forest Service Southern Region; Clemson University, Extension Forest Resources; Southeast Regional Biomass Energy Program; and Global

United States Forest Service

Urban Wood: A Waste or Resource Workshop

Global (NEOS) conducted a workshop called "Urban Wood: A Waste or Resource. The purpose of the workshop was to provide up-to-date information on opportunities for converting wood waste to a variety of useful products including fuel, compost, mulch, and building materials. Global's responsibilities included: all logistics (i.e., facilities, handout materials, hotel, agenda, audio-visual equipment); organizing breakout sessions with a professional facilitator to provide comments; arranging exhibits; speaker coordination; publicity; creating and mailing brochures; producing a technical resource notebook; organizing tours; and making presentations.

Utility PhotoVoltaic Group

UPVG Workshop Series - PV Applications Workshop Development/Presentation

Global (NEOS) coordinated and implemented a series of eight workshops throughout the U.S. for the Utility PhotoVoltaics Group (UPVG). The purpose of these workshops was to provide information to utility audiences on PV system capabilities, limitations, costs, and benefits, as well as describe cost-effective PV applications used by utilities and their customers. Global's role in the workshops was to facilitate this information transfer by developing each workshop agenda, presenting information on various PV topics, and assembling workshop notebooks that contain the most up-to-date supporting materials. To ensure a diverse utility audience, Global also created the workshop brochures, identified brochure mailing lists, and located appropriate "special topic" speakers as required.

Multiple Clients

Commercial Food Service

Global (GRI and EPRI) has led the energy industry in R&D and market transformation of commercial food service equipment and information. Critical to sustained market transformation has been the attention paid by GRI and EPRI to developing and disseminating key technical information relevant to kitchen ventilation codes, electrical codes, design standards, and efficiency requirements. The ties of Global (GRI and EPRI) to gas and electric utilities has been important in ensuring the transfer of technology gets disseminated at a local level to commercial kitchen owners. In the area of kitchen ventilation, Global (GRI and EPRI) has provided key test data on kitchen ventilation needs and requirements. Through their efforts in commercial food service, Global (GRI and EPRI) has provided a portfolio of complementary products and information to satisfy customer choices for a wide variety of commercial cooking needs and applications.

PROVIDING TECHNICAL AND REGULATORY ASSISTANCE

- Project Management
- Quick Response Technical Support
- Expert Witness Testimony
- Resource Planning
- Technology Assessment

Representative Clients and Projects:

Moffett Federal Airfield

NASA Onsite A/E Services

Global (DMJM) is providing the NASA-Ames Research Center with ongoing architecture and engineering services in support of the center's unique and often complex facilities-related projects.

In addition to providing architecture and engineering services, Global has responsibility for master planning and long-range facility planning, preparation and justification of "construction of facilities" budget cycle submittals, pre-paration of associated environmental impact statements and assessments, preliminary and final design, and budget management of projects in accordance with the facility planning schedule.

Global provides formal engineering reports, drawings, specifications, associated data, as-built documentation, design calculations, and cost estimates in support of facility-related designs, survey reports, studies, environmental engineering reports, and problem assessments.

In addition to conducting feasibility studies of proposed projects, Global analyzes the impact of such projects on existing services and facilities. Global also works closely with NASA customers to gather information in support of project requirements. Task sizes vary from minor construction and rehabilitation projects costing less than \$200,000, construction of facilities projects costing from \$200,000 to \$1 million, to discrete projects costing more than \$1 million.

U.S. Postal Service

Support Service Contracts

Global (DMJM) provides project and construction management services, including the design and construction of customer support facilities, for the USPS in Southern California. This award represents Global's fourth project and construction management contract with the USPS in the western region since 1987.

This project is indicative of Global's ability to handle large-scale, multifaceted management tasks: the contract covers more than 125 new projects in Southern California, as well as some 100 rehabilitation projects. The construction management budget is developed, maintained, and reported by the project manager. In fulfilling this contract, the Global project manager is responsible for selecting, hiring, and retaining the necessary personnel resources (internal staff and subcontractors) to accomplish the work. Global is involved at every stage in the acquisition, monitoring, and review of subcontracted work: tasks include preparing bid packages; overseeing work in-process and completed; and recommending appropriate payment. Invoicing from subcontractor's flow through the Global project office to the USPS.

Eneractiv, LLC

Administrative and Financial Support Services Global (NEOS)

Global (NEOS) is currently providing all of the administrative and financial support services for Eneractiv, LLC, a high technology market data development joint venture between EPRI and GRI.

This recently formed entity has obtained seed financing in excess of \$15 million. Global has developed all of the administrative accounting and financial procedures, methodologies and reporting/tracking protocols and has successfully implemented these procedures within an extremely short time (less than 6 weeks).

Entergy

Energy Services Program Development

Global (NEOS) provided assistance to Entergy in their development of an energy services business strategy. This work was developed for Entergy's integrated resource plan filing on behalf of its Gulf States affiliate in the State of Texas. The work involved developing energy efficiency market transformation program delivery strategies targeted to the consumer and small business markets. The project also involved the development of regulatory business strategies and testimony preparation.

China Power & Light

Development of DSM Incentive Scheme

In this project, Global (EPRI) provided overall coordination and technical management of a project for China Light & Power (CLP) to bring about the development and adoption by the Hong Kong Government of a DSM Resource Plan for CLP that balances the needs and concerns of shareholders, ratepayers, and regulators. Major topics covered include DSM regulatory incentives review and negotiation, benchmarking studies of US utilities, and DSM resource plan development and adoption.

This effort not only developed the DSM resource plan for CLP but involved CLP staff in such a way that the DSM program design can be carried forward internally. In addition, the benchmarking analysis and support to negotiations has allowed first-hand experience with US DSM programs to enter the discussions between CLP and the Hong Kong government. Finally, a workable 3-year DSM plan was delivered.

Western Area Power Administration

Integrated Resource Planning Study for Heartland Consumers Power District

This IRP development effort for Heartland and selected utility members was the first project in the nation involving IRP for a Joint Action Agency. Global (NEOS) conducted a comprehensive IRP needs assessment and developed a detailed data collection strategy, and integrated the identified cost-effective DSM program options with supply-side resource options using Global's EFRAM software, resulting in a set of scenarios that can be applied to Heartland's 18 utility members. Global also helped Heartland address the need for a primary source of regional data by performing residential, commercial, and industrial sector end-use surveys for all 18 Power District members. The results from these surveys formed the basis for IRP development for Heartland and its customer members.

Direct Technical Assistance Support Contract

Global (NEOS) provided technical assistance support services to WAPA's Energy Services Program for over twelve years through a series of competitively won multi-year contracts. Global staff have

completed over 300 projects in the areas of direct technical assistance to WAPA and many of its approximately 800 customers. Over the course of these twelve years, Global and its staff accumulated an in-depth understanding of the technical and regulatory processes which affect the availability, production, and delivery of power through the WAPA system.

Global has helped many public utilities become more competitive, financially stable, and reliable through direct assistance efforts related to this contract, through anticipation of policy initiatives and regulatory requirements under current or future development. Understanding and responding to the 1992 Energy Policy Act (EPACT) and the subsequent Integrated Resource Planning (IRP) requirements represent an example of policy development and implementation affecting WAPA and its customers. The interaction and evolution of these policies with utility deregulation and its market forces present the next challenges facing municipal and other public power systems.

Power Marketing Support Services

From 1986 through 1996, Global (NEOS) provided support services in the areas of resource planning, rates, finance, energy services, environmental compliance, public relations, data acquisition and analysis, and revenue requirements to Western's Power Marketing Division in the Salt Lake City area region. Global on-site staff provided support in computer modeling and statistical analyses of power production resulting from various scenarios of conditions of the Colorado River including monthly analyses of the net expenses of the operations of the federally owned dams on the river.

PV Circuit Rider

To address PV program implementation barriers for electric utilities, Global (NEOS) provided direct on-site support for utility PV program assessment, development, and implementation. Global provided a PV "circuit rider" to provide education and training, PV program development, and design, installation, and maintenance support as required. The program served 16 active utility members in Colorado, Nebraska, and Wyoming. The utilities include both rural electric cooperatives and municipalities, and their PV experience ranged from those with existing PV service programs to those with no experience at all. The program, which evolved into the Photovoltaic Services Network, was collaboratively funded by Western, EPRI, Sandia, NREL, the Colorado Office of Energy Conservation, and the utility participants.

US Department of Energy, Federal Energy Management Program

Direct Technical Assistance Support Contract

Through a subcontract with the National Renewable Energy Laboratory, Global (NEOS) provided technical, economic, and marketing support services to the Federal Energy Management Program in the area of solar technology deployment. As part of these efforts, Global conducted analysis for Federal facilities to determine the cost-effectiveness and technical viability of solar purchases. Global also provided substantial support to the FEMP program in terms of identifying regulatory opportunities and barriers to the purchase solar energy by Federal facilities, as well conducted economic analyses of new and innovative contracting mechanisms applicable to the Federal sector. Global also worked with DOE Headquarters to develop a regional implementation plan for the President's Million Solar Roofs Initiative.

Macro International

US Department of Energy, Motor Challenge Program Technical Support

For this effort, Global (NEOS) produced a document to guide the development of a motor systems management program. This step-by-step guide was designed for use by motor end-users to produce a program to improve the efficiency of motor-driven systems. Development and implementation responsibilities were suggested for seven business functions commonly found within a facility: engineering, maintenance, production and operations, procurement, finance, information systems, and management. This guide is now being distributed on CD-ROM to all Motor Challenge program partners.

State of Hawaii

State and County Energy Emergency Preparedness Plan Development

Global (NEOS) assisted the State of Hawaii, and its four island counties in the development of coordinated and consistent Energy Emergency Preparedness (EEP) Response Plans. The project required a four phased approach to 1) revise the State's EEP Plans, 2) develop a master plan delineating communication channels and lines of authority from the federal level down to the field response crews, 3) develop individual County Operational Plans, and 4) design, implement, and evaluate an Energy Vulnerability Survey to identify potential vulnerabilities and mitigation shortage strategies for each county. As a result of this project, the state and each county were provided with a customized plan to prepare for, and respond to all types of potential energy emergencies.

California Energy Commission

Energy Emergency Response Plan Development

Global (NEOS) provided direct technical support to local governments (counties and cities in California) for energy shortage contingency planning activities. It was designed to develop a model local government energy shortage contingency plan, and offer technical assistance to tailor the model to the unique needs of local jurisdictions. It is intended to integrate energy planning and emergency response functions at the state and local levels. Tasks included:

- Development of procedures to assist local governments in identifying critical energy needs for fleets and facilities, and development of detailed strategies for local government contingency plans to reduce the use of petroleum, natural gas and electricity during an energy shortage;
- Preparation of a Model Local Government Energy Shortage Contingency Plan;
- Selection of six pilot counties, and application of the Draft Model Local Government Energy Shortage Contingency Plan to specific local contingency planning needs;
- Organization and implementation of a series of six regional one-day workshops to provide technical assistance for local governments; and
- Evaluation of the Energy Commission's Local Government Contingency Planning Program, and preparation of a written Program Evaluation Report.

Corporation for Solar Technologies and Renewable Resources (CSTRR)

Technical and Marketing Support

Global (NEOS) provided technical and marketing support through the U.S. Department of Energy's Federal Energy Management Program (FEMP) in support of the Corporation for Solar Technologies and Renewable Resources (CSTRR). CSTRR is a not-for-profit private corporation with the mission of aggregating sufficient electrical loads to allow for the cost efficient generation of solar power. Global identified Federal sites as possible purchasers of CSTRR solar power, and conducting technical analyses for these facilities to determine the most-cost-effective purchase option. Global also studied the power delivery costs involved with transmission wheeling, power swaps, competitive transmission charges, and distributed generation options to determine power delivery costs.

Wisconsin Electric Power Company

DSM Planning, Marketing and Implementation of "Smart Money" Program

Global (DMJM) supported Wisconsin Electric Power Company in the operation of the "Smart Money" program, a demand-side management (DSM) initiative designed to eliminate or delay the need to built power plants. Global was responsible for the implementation, technical management, and administrative support of the ongoing program. The Smart Money program offered customer education, technical assistance, and financial incentives to commercial, industrial, government, agricultural, and residential customers for energy efficiency projects. The program produced significant peak kilowatt and kilowatt-hour reductions. Peak demand was reduced by more than 200 MW during the course of Global's administration.

Global developed the program budget; administered and tracked incentive payments, and reported to Wisconsin Electric on program status. Programs and budgets for the out-years were revised to exploit "lessons learned" from day-to-day management of the contracts with the various program Implementers. To fulfill the objectives of the Smart Money program, Global provided project technical and economic feasibility studies; engineering analysis and design; trade ally support; energy audits; and program tracking and reporting.

Multiple Clients

Infrared Drying Program

Global (GRI) is involved in application verification for natural gas infrared (IR) use, addressing the paper drying market segment. This latest stage follows a program to develop improved IR burner materials. Products were developed and tested using reticulated ceramic structures, ceramic fiber, and metal fiber materials. These products have been used by Alzeta, Eclipse Combustion, and Hauck Manufacturing. The release of technology to multiple manufacturers ensures a competitive environment that helps to minimize costs to industrial end users and a competitive, sustainable market. However, the paper industry has yet to accept high thermal energy density emitters, i.e., IR emitting burners, as an alternative heat source to steam-heated drying cylinders, due to their aversion to open flames. The overcoming of this aversion is a critical barrier-removal step in market transformation of this technology. Global (GRI) has established alliances to address end-user needs and to support adoption and market transformation of new technology. Paper manufacturers can now partner with Impact Systems – an IR equipment manufacturer – to install an IR system relatively risk-free. The customer pays for the system when it delivers on expectations. As part of a gas industry consortium, an IR preheating test platform is available for paper industry use at the Herty R&D

Center, where paper and paperboard companies can assess benefits using their grade of furnish (raw materials used for paper production) before installing gas-fired IR on their own machines. This helps to minimize risks to the manufacturer and increase manufacturer confidence in new and relatively untried products. Global (GRI) has established a program to address risk through in-house, small-scale testing or off-site testing at Herty. Financial risk is also reduced through performance-based contracting options and development of financing programs with gas utilities, manufacturers, and investors. Reduced energy consumption can provide cash flow streams to support project.

Sempra Energy Solutions

SuperESPC Technical and Marketing Support

Global (NEOS) provided technical and marketing support to Energy Pacific, one of five Energy Savings Performance Contractors (ESPC) selected to provide energy efficiency services to Federal facilities in eight western states. Global provided support in identifying candidate facilities, developing preliminary feasibility assessments, and participating in specific project development areas related to energy efficiency, water efficiency, and renewable energy technologies

DEVELOPING STRATEGIC AND TACTICAL MANAGEMENT PLANS

- **Marketing and Business Plan Development**
- **Key Account Program Development**
- **Benchmarking**
- **Risk Assessment and Management**
- **Strategic Options Analysis and Development**
- **Development of Competitive Products and Services**
- **Technology and New Product Development**
- **Development of Customer Retention and Economic Development Programs**

Representative Clients and Projects:

EPRI

Distributed Resource Technologies

Global (NEOS) conducted a project for EPRI designed to impact the market value and total market potential for Distributed Resource (DR) solutions by identifying and utilizing unique customer or technology value adders overlooked or underestimated in traditional DR market assessments. As part of the project, Global (NEOS) developed a methodology to evaluate the potential for DR within a customer segment taking into account all customer needs that could be met with a DR solution and defined and evaluated a market value equation for DR in five selected customer sectors. NEOS identified the potential market value adders that could apply to the DR value equation in the selected markets and evaluated the potential for realignment of the DR technology value equation based on these value adders.

Global is currently conducting two follow up studies for EPRI that will employ the methodology developed in the first study to evaluate the potential for DR in three additional commercial and industrial customer segments.

Utility Procurement Benchmarking Study

Global (NEOS) supported EPRI in a groundbreaking effort to establish baseline benchmarking standards for utility procurement operations in the area of services contracts. Although utility procurement operations play a pivotal role in a utility's day-to-day operational functions, to date, little has been done to quantify and evaluate the operational performance and cost effectiveness of a utility's procurement activities. EPRI targeted a benchmarking survey that measured and evaluated the procurement operations of an initial group of approximately twenty utilities.

This benchmarking project provided participants with both qualitative and quantitative information. The survey summarized organizational structures, key operational elements and described the various processes and methodologies currently in use. Then a series of detailed, standardized performance metrics quantified procurement department efficiency and cost/benefit. This data allowed the participating utilities to effectively evaluate their own procurement operations versus other utilities, and other related industries. It also provided the tools to define/develop improved performance criteria for their operations in the future. A major benefit of the study was a discussion of utility procurement "best practices" in each of the procurement operations key elements, such as risk management, performance incentives, lines of authority.

Strategic Connections

Global (NEOS) provided EPRI with technical and managerial support for the development and implementation of EPRI's 1998 Strategic Connections roundtables: Strategic Connection II - Distributed Resource Business Opportunities and Strategic Connections III - Knowledge-Driven Competition in Electricity Markets (Information Technology Business Opportunities). These workshops were designed to assist key utility/energy service provider executives (CEO or Senior VP level) in developing successful business strategies for selected markets and technology applications. Global was the lead entity responsible for the successful definition, development, and implementation of the two programs.

Confidential Client - Utility Association

Strategic Business Plan Development

Global (NEOS) developed a Strategic Business Plan for the client's new business initiative. The business plan delineated all key elements required to formulate a concise business strategy and approach for the client's initiative, including competing products, how the product might be integrated into future business products, and how the client could utilize the initiative to further its short and long-term objectives.

Sempra Energy Solutions

Market Assessment, Segmentation, and Strategic Plan Development

Global (NEOS) supported Sempra on various market transformation studies that helped shape the marketing strategies for this new energy service company. The studies focused on assessing market and customer-specific data on energy consumption, customer needs and issues, and decision-making processes. Work also involved the development of pricing and risk management strategies. Global is also developing a software tool for Sempra that was intended to simplify the application of the DOE-2 engineering simulation model. The tool is being used to assess the cost-feasibility of various energy efficiency products and services.

Entergy Corporation

Custom Energy Efficiency Program Development

Under this multi-year tailored collaborative project, Global (NEOS) developed a custom energy efficiency program targeted to various segments within their commercial sector -- hospitals, military bases and grocery stores. The objective of the program was to offer customers value-added energy services including technical audits, installation assistance, project financing and monitoring equipment in exchange for the customer committing to long-term power contracts.

California Energy Commission

Energy Efficiency Standards Cost Benchmarking Study

The purpose of this project was to develop a building construction and energy efficiency measure cost benchmarks for the residential and nonresidential sectors to support the refinement of California's Building Energy Efficiency Standards. This database was compiled for the CEC using existing sources of measure cost data, and through primary data collection of cost and other information from manufacturers and vendors. The study resulted in comprehensive benchmarks for purchase and installation price data for construction materials and building equipment affected by the Standards, as well as anticipated maintenance costs, useful life, and replacement costs for future retrofit activities. The information compiled as a result of this project was contained in a Paradox relational database for use by the commission in house economic analysis. These analysis results would then be used to justify adoption of new conservation measures and technologies.

Potomac Electric Power Company

DSM Program Analysis and Evaluation

To support filings with the State of Maryland and the District of Columbia, Global (NEOS) conducted economic and engineering analysis of Pepco's DSM Programs. These analyses included life-cycle costing, installation and equipment costs, energy and demand savings, and applicability to various building types and vintages. Global conducted the analysis separately for filings with the State of Maryland and the District of Columbia using data specific for each state.

Competitive Cooking Technology Study

In a competitive technology assessment, Global (NEOS) compared the overall energy impacts associated with different types of commercial cooking equipment configurations. This thermal load analysis was conducted through the DOE-2 model. Baselines were created using Pepco-specific data on commercial prototypes for fast-food and sit-down restaurants, hospital buildings, and college dormitory facilities. All-electric cooking configurations were based on industry data along with demonstration results from Pepco's market research department.

The Photovoltaic Services Network, Inc. / Altair Energy, LLC

The Photovoltaic Services Network, Inc. (PSN), a non-profit member organization of electric utilities, was set up by Global (NEOS) and key rural electric cooperatives in 1995 to support the use of photovoltaic (PV) power for off-grid applications. The PSN focused on ensuring that cost-competitive, utility-grade, packaged PV products are available for various off-grid applications, such as livestock water pumping, remote residences, lighting, and cathodic protection among others. Global provided the technical, management, and financial/accounting support to run the organization.

The primary objectives of the PSN were 1) to consolidate utility requirements for specific PV applications into standardized PV system specifications; 2) to coordinate utility member purchases for "packaged" PV products through negotiated volume pricing agreements with suppliers; 3) to provide education, training, and installation support as required by member utilities; 4) to establish a forum for member utilities to exchange ideas on PV program implementation and marketing methods; and 5) to identify and acquire funding sources for product development and testing.

Global (NEOS) provided all managerial, technical, and administrative support services to the Photovoltaic Services Network (PSN) from its inception in 1995 until its purchase by Altair Energy, in 1998. The PSN was a non-profit renewable energy applications support service entity formed by seven charter utilities. Within its first year of operation, and throughout its evolution, the PSN had over fifty utilities as sponsors and/or participants. The Global support service activities, included responsibility for all financial, administrative and program management. Global personnel handled all accounting, financial reporting, performance monitoring and tracking, contracting, etc. based on a standard series of procedures approved by the participating utility members.

Southern California Edison Company

PV Market Benchmarking Study

Southern California Edison (Edison) contracted with Global (NEOS) to implement a benchmarking study to establish baseline information for a pilot PV program market assessment. To conduct the

market assessment, Global implemented three separate surveys. The PV Industry survey was developed to determine the PV industry's size, capabilities, and willingness to work with Edison. The Remote Residential survey was developed to assess the attributes and requirements of off-grid homes, as well as homeowner interest in Edison's program. A third survey, the Non-Residential applications survey, was developed to gather information from commercial consumers who had contacted Edison with an interest in the PV program. Global evaluated and documented the results of the three surveys, as well as the market assessment database for their PV program.

Western Area Power Administration

Competitive Analysis and Strategic Planning Program Plan

Under this task, Global (NEOS) developed a competitive strategy program for public power systems. This program consisted of a ten step approach to assessing the competitive position of individual utilities, identifying competitive program options and business retention strategies, developing competitive program concepts and marketing plans, as well as developing innovative rates to complement program implementation strategies. As the plan was completed, two electric utilities, Columbus Electric Cooperative in New Mexico and Medina Electric Cooperative in Texas, were selected to pilot test the program components. Due to the highly successful results of these preliminary efforts, this program was expanded to WAPA customers throughout a thirteen state region.

Solar Enterprise Zone (SEZ/CSTRR) Market Survey

Under the Defense Reauthorization Act of 1992, a Solar Enterprise Zone (formally called SEZ, now called CSTRR) was slated for development in southern Nevada. WAPA agreed to support the development of the CSTRR by acting as a marketing agent for CSTRR power. In support of Western's marketing efforts, Global (NEOS) conducted a detailed market assessment/benchmark study. Global contacted 441 potential purchasers of SEZ power within the states of Nevada, California, Arizona, Utah, and New Mexico. In all, Global contacted 175 Native American Tribes, 130 military facilities, 14 DOE facilities, including national labs, 12 federal correctional facilities, 79 other federal entities, and 31 utilities. After compiling the mailing list, Global developed a market assessment form and a color brochure. Global implemented the survey, and collected and analyzed all responses. Of the 175 useful respondents, 101 indicated that they would be interested in purchasing CSTRR power.

Western Area Power Administration, Salt Lake City Area Office

Customized Rate Design

Under this two-year project, Global (NEOS) worked with selected Western customers to implement a wholesale time-of-use rate provided on a pilot basis Western. Global developed this wholesale time-of-use rate on a cost-of-service basis, and designed the marketing strategy to provide the desired price signals to the customer. Global also worked with the Western customers to identify DSM strategies which would take advantage of the rate and provide both utility and customer savings on demand charges and energy costs. Specific technical support to the utilities included: providing in-depth end-use metering and querying meters on a monthly basis to determine existing energy consumption patterns; identifying cost-effective DSM strategies to modify energy consumption; providing energy audits of large end-users to assist in the DSM opportunity assessment; and evaluation assistance to determine the actual energy and dollar savings impacts of the program.

Navajo Agricultural Products Industry

Competitive Options Analysis and Strategic Plan Development

Under this project, Global (NEOS) conducted a competitive assessment for the Navajo Agricultural Products Industry to assist in identifying potential low cost electricity suppliers as part of a major economic development initiative. For this effort, Global conducted an analysis to determine all of the potential energy suppliers available to the NAPI, as well as the delivered costs to the economic development region based on supplier costs, and wholesale wheeling charges. In addition, Global identified several economic development initiatives which were highly applicable to the NAPI region. These initiatives are currently being pursued by NAPI.

Geothermal Heat Pump Consortium

Geothermal Marketing Expertise Resource and Information Team (GeoMERIT)

Global (NEOS) provided on-call marketing assistance to the Geothermal Heat Pump Consortium (GHPC) and its members in accelerating the market development of geothermal heat pumps. Assignments thus far have been to review two rounds of proposals submitted by Consortium members to develop model utility geothermal program demonstrations. The reviews were sent to all members of the utility sub-committee and were discussed at length to determine their merit and value to other GHPC members. Projects involved working with individual utilities to help develop new programs and initiatives to increase the market for geothermal heat pumps.

International Society of Arboriculture Research Trust

National Tree and Landscape Residue Survey

Global (NEOS) conducted the first nationwide survey of the urban tree care industry in an effort to quantify and characterize urban tree and landscape residue. As part of this project, Global identified and surveyed seven separate urban tree residue "generator" groupings: commercial tree care firms, municipal park and recreation departments, municipal and county tree care divisions, electric/telephone utility power line maintenance departments, land developers, orchards, nurseries, and landscapers. Global worked closely with each generator groups national trade association. Global sent out approximately 4,000 surveys. The overall response rate to this survey was higher than 50 percent, although several of the more important generator groupings had response rates in the 70 to 90 percent range. The national inventory provided benchmarks for volume, characteristics and disposal of the residues on both a regional basis as well as by population size of metropolitan area. The data are compiled in a geographic information system (GIS) for analysis and reporting purposes.

Multiple Clients

Corrugated Stainless Steel Tubing (CSST)

Global (GRI) funding, program design, and project management were instrumental in the development, testing, and commercial introduction of corrugated stainless steel tubing (CSST) in the United States and Canada in 1990. A systems approach was employed in program design to integrate the development of the entire interior piping system, including meters, meter to individual unit piping, interior piping materials, conduits, installation procedures, gas outlets, and appliance connectors.

CSST is used to distribute natural gas throughout the interior of residential and commercial buildings. This novel system previously had been used in Japan for several years. An alternative to traditional black-iron piping, the flexible CSST system makes natural gas a feasible option in renovated multifamily and multistory commercial buildings where black iron pipe is prohibitively expensive.

To overcome code barriers related to the approval and installation of this new system, Global thoroughly evaluated the performance of CSST, then facilitated complex interactions with code officials, utilities, and builders and led efforts to get CSST written into U.S. local, state, and national model plumbing codes.

Evaluation of the Gas Utility and Customer Benefits from RD&D Programs

Global (GRI) has assisted several distribution companies (SoCal Gas, Baltimore Gas & Electric, Keyspan, Consolidated Edison) and a pipeline company (El Paso Natural Gas) in comprehensive evaluations of the benefits that they and their customers have received from their funding of natural gas related RD&D. The assessments resulted in estimates of the benefits realized by major utility functional units and estimates of the overall benefit-to-cost ratios of the companies' expenditures on the research programs. The results of these assessments have been used to support internal company decision making and to provide information to regulatory agencies on the return on RD&D investments to gas customers.

Design and Implementation of a Corporate Performance Measurement and Incentive Pay System for an RD&D Organization

Global (GRI) developed and implemented a performance measurement system and a two-component incentive pay system that has been used internally at GRI by their Board of Directors since 1993. Included in this system were metrics to measure the market impacts of GRI programs seen by the natural gas industry and its customers, a corporate wide incentive pay plan for all GRI staff, and a bonus plan for senior executives. The system has received scrutiny from an independent auditor for the past three years with very favorable comments.

VISA International

VISA Y2K Utilities Assessment

Under subcontract to Logica Inc., Global (NEOS) assessed the risk of electric service disturbances to key VISA sites and operating centers throughout the world due to "Year 2000" problems at the local utilities. The study included identification of the utilities providing electricity to key VISA sites, evaluation of the utilities' Y2K readiness efforts, and classification of utilities in terms of the risk they represent to continuous Visa operations as the new millennium begins. The study provided VISA with an indication of which sites are more vulnerable and likely to have problems with their electricity supply. The assessment also outlined where preventive action, in terms of back up electricity supply and new processing arrangements, needed to be taken to prevent business interruption and loss of revenues.

PERFORMING QUALITY ENERGY AND ECONOMIC SIMULATIONS

- **Data Collection**
- **Resource Planning**
- **Situation Analysis**
- **Forecasting**
- **Economic Analysis and Modeling**

Representative Clients and Projects:

EPRI

Load Shape Volatility Assessment

As the electric industry moves toward a competitive future, it is increasingly important for retail distribution companies to be more knowledgeable of the electricity consumption patterns of their customers. In this project, Global (NEOS) conducted detailed engineering and statistical assessments of the factors that result in variation in customer electric loads for key customer segments within selected geographical regions. Three geographical regions, Southeast, Midwest, and Pacific Southwest and for customer segments, Large Office, Large Retail, Hospital, and School were selected for analysis. The influence on loads of factors such as weather conditions, occupancy rates in office buildings, level of commercial activity in retail establishments, and bed occupancy rates in hospitals were studied. Engineering simulation models were used to perform the load volatility engineering assessment and regression models were developed to conduct the statistical assessment.

City of Riverside Public Utility

Customized Rate Designs

Global (NEOS) provided Riverside (RPU) with a series of technical assessments that ultimately lead to customized rates and a complementary package of products and services that support the rate offering. Product assessments included identification of value-added services that could augment rate packages. Examples included medical waste electrotechnologies for selected healthcare customers and environmental compliance technologies for selected institutional dry cleaning operations and waste-water treatment plant operations. RPU identified four key customers where the assessments were targeted. Those customers represented RPU's largest commercial and industrial loads and as such were looked at with great importance in light of the changing business environment facing municipal utilities in California and throughout the nation.

City of Colton, California

Technical Support for Industrial Products and Rate Designs

Global (NEOS) developed customized assessments for four of Colton's largest commercial and industrial customers which allowed them to enjoy significant savings on operating budgets while at the same time improving operational efficiencies. The project involved conducting engineering assessments of different product packages that could be delivered to these customers.

City of Farmington, New Mexico

Resource Plan Development

Global (NEOS) developed the technical elements of Farmington's electrical resource plan. Global obtained historical sales data and customer characteristics data to develop the energy and peak demand forecasts for the City. After completion of the load forecasts, Global conducted a customer survey of Farmington's commercial sector to collect customer characteristic data for use as input into the Global developed Demand Side Management Resource Assessment Model (DSM-RAM). Results from the customer surveys were linked to the load forecast results along with a database of DSM measure impacts and measure costs to identify DSM potential. This DSM potential, along with

information on conventional supply resources and alternate energy resources was placed in resource optimization model to identify the least cost resource mix for the City of Farmington.

Marine Corps Air Station at Yuma, Arizona

IRP Development for the Marine Corps Air Station at Yuma, Arizona

Global (NEOS) developed the technical elements of the electrical resource plan for the Yuma Marine Corps Air Station (Yuma). For this effort, Global obtained historical electrical sales data, building stock characteristics, base personnel population, and weather data. Energy and peak demand forecasts were developed using an econometric model developed by Global. Forecasts for the energy and peak DSM potential was performed using the Global developed DSM-RAM model and was compared to conventional supply and alternate energy resources to identify the least cost resource mix for Yuma.

The City Of Lassen Municipal Utility District (MUD), Trinity County Public Utility District (PUD), and The City of Turlock Irrigation District (ID), California

Resource Plan Development

Global (NEOS) developed the technical elements of the joint electrical resource plan for Lassen MUD, Trinity PUD and Turlock ID. Global obtained historical sales data and customer characteristics data to develop the energy and peak demand forecasts for the three entities. Global also conducted customer surveys of the residential and commercial sectors for each utility. Results from the customer surveys were linked to the load forecast results along with a database of energy efficiency measure impacts and measure costs within DSM-RAM to identify energy efficiency potential. This DSM potential, along with information on conventional supply and alternate energy resources was placed in resource optimization model to identify the least cost resource mix for the three utilities as a group.

State of Hawaii, Department of Business, Economic Development and Tourism

A Comprehensive Assessment of Hawaii's Energy Efficiency Potential

Global (NEOS) developed an electricity and gas energy efficiency forecasting model for the State of Hawaii. This comprehensive model covered each island by sector (residential and commercial) and provided estimates of the energy efficiency resource at the measure level for each year in the 20-year forecast horizon. The model was linked to the output of the state's energy forecasting model. In addition to adapting and expanding its own energy efficiency software, Global developed much of the baseline information on building characteristics, end-use, and energy efficiency impacts by performing on-site building audits of commercial buildings in Hawaii, developing profiles of typical buildings, and running the DOE-2 building energy simulation model. Results from the DOE-2 runs provided baseline energy use values for the buildings and appliance stocks and estimates of the impacts of individual energy efficiency measures on each type of typical building.

California Conservation Inventory Group & Southern California Edison

Mutual Exclusivity and Rank Ordering Of Interactive DSM Measures

The goal of this study was to provide Edison with a algorithms that 1) identified the rank ordering of energy efficiency measure implementation for measures that have interactive effects and 2) estimated measure proportionality between energy efficiency measures that are mutually exclusive. Data from

actual measure implementation through Edison's Residential Energy Management Incentive Program and Energy Management Hardware Rebate Program were analyzed to estimate the loading order and proportional share of interactive and mutually exclusive measures, respectively. A discrete choice estimation technique was used to estimate the probability of adoption between the mutually exclusive measures and the loading order of the interactive measures.

California Energy Commission

Natural Gas and Electric DSM Forecasting Model

Under a contract to the CEC, Global (NEOS) developed a natural gas DSM forecasting model (CAL-RAM) that identifies DSM resource potential by climate zone and sector for the state. The model is segmented into the residential, commercial, and industrial sectors and is directly linked to the outputs from the CEC energy forecasting models for information on building stocks, SIC code distribution, appliance saturation and other characteristics. Output from CAL-RAM is both in aggregate form that identifies total DSM potential over the course of the forecast period, as well as at the DSM measure level. The information at the DSM measure level allows for the identification of the contribution of each DSM technology or measure to the energy and peak savings potential and costs.

Post Occupancy Residential Survey

For this project, Global (NEOS) managed collection of data and conducted the analysis from 400 single-family detached homes constructed since July 1, 1989, distributed across all 16 California climate zones. The five primary purposes of this effort were to examine: if, and how, the surveyed homes initially complied with Title 24 standards; if energy efficiency measures were removed after homeowner occupancy; if additional energy efficiency measures were installed after homeowner occupancy; why energy efficiency or energy saving measures were removed or installed by homeowners; and how the results of these 400 surveys compare with two previous Commission surveys.

Western Area Power Administration

Technical Assistance to Empire Electric

Global (NEOS) performed a feasibility analysis for Empire Electric, which was faced with replacing a 60-year old feeder line to a National Park and was considering a PV-generator hybrid system as an alternative to the line reconstruction. Global performed a complete site energy audit, qualified appropriate DSM and fuel switching measures, initiated computer design simulations, determined system O&M and replacement costs, and presented levelized cost economic analysis.

Public Service Company of Colorado

Gas Boiler Impact Evaluation Study

Global (NEOS) determined the energy and demand impacts of the utility-sponsored program to convert electric boilers to high efficiency gas boilers in three nonresidential buildings. Global documented the conversions made at each building, collected gas use monitoring data from the utility, analyzed the data, and determined the associated net energy savings.

Potomac Electric Power Co. (PEPCO)

Construction Management/Commissioning: Energy-Efficient Retrofits

Global (DMJM) developed and implemented a comprehensive set of project controls and procedures. This included a computer-based cost control and estimating system; program and project-specific CPM schedules; design review procedures; bid and award evaluations; and a construction administration program. An executive committee was organized to handle routine action items, critical issues, and organizational interaction to facilitate the initiation of a new operating department within PEPCO.

Global conducted a value-engineering program to produce savings in both construction costs and installation time. In developing project controls and procedures, Global was responsible for conducting energy evaluations; developing programs; collecting information, including public input; and reviewing programs.

Electricity Generating Authority of Thailand

Data Warehousing

Global assisted Excellent Energy International (EEI), Bangkok, in the development of 6 separate set of survey instruments to develop a data collection and management "Data Warehousing" program for the Electricity Generating Authority of Thailand (EGAT). The project was initiated by their Demand-Side Management Office in order to develop a system design document. It was also designed to install one component of the Management Information System (MIS) architecture that relates to EGAT's tracking and reporting of DSM achievements to date.

REPRESENTATIVE CLIENTS

Global has provided technical services to a diverse group of utilities, government agencies, and private businesses. The following is a representative list of these clients:

- Allegheny Power Service Corporation
- Bangkok Produce
- California Conservation Inventory Group
- California Department of Fish & Game, Office of Spill Prevention and Response
- California Energy Commission
- Central and Southwest Corporation
- China Light & Power
- Citizens Utilities Company, Kauai Electric Division, Hawaii
- City of Alameda Bureau of Electricity, California
- City of Azusa Light and Water Dept., California
- City of Burbank, California
- City of Colton, California
- City of Farmington, New Mexico
- City of Fort Collins Light and Power Company, Colorado
- City of Gunnison, Colorado
- City of Holland, Michigan
- City of Longmont Electric Utility, Colorado
- City of Loveland Light and Power, Colorado
- City of Pasadena, California
- City of Riverside, California
- City of Roseville, California
- City of Scottsdale, Arizona
- City of Willmar, Minnesota
- Coalition of Northeastern Governors
- Colorado Springs Utility
- Dairyland Power Cooperative, Wisconsin
- Dinè Power Authority
- Duke Power
- Electricity Generating Authority of Thailand
- EPRI
- Entergy Corporation
- Fort Carson Army Base
- Fuel Resource Development Company (Division of PSCO)
- Geothermal Heat Pump Consortium
- Golden Photon, Inc., A Division of ACX Technologies Inc.
- Indiana Department of Commerce, Energy Policy Division
- Integrated Ingredients, A Division of Burns Philp Food Inc.
- Intermountain Consumers Power Association, Utah

REPRESENTATIVE CLIENTS (Continued)

- International Society of Arboriculture Research Trust
- Lincoln County Pour District No. 1, Nevada
- Los Angeles Department of Water and Power
- Lower Colorado River Authority, Texas
- Macro International
- Marine Corps Air Station at Yuma, Arizona
- Medina Electric Cooperative, Texas
- Moffett Federal Airfield
- Mpumalanga, South Africa
- National Arborist Foundation
- National Park Service, Acadia National Park
- National Renewable Energy Laboratory
- Navajo Agricultural Products Industry, New Mexico
- Navajo Tribal Utility Authority
- Nevada Tahoe Conservation District
- North Dakota Office of Intergovernmental Affairs
- Northern California Power Agency
- Northeast Utilities
- Northern States Power
- Nueces Electric Cooperative, Texas
- Oglethorpe Power Corporation
- Ontario Hydro
- Pacific Gas and Electric Company
- Plains Generation and Transmission Cooperative, Inc., New Mexico
- Platte River Power Authority, Colorado
- Plumas-Sierra Rural Electric Cooperative
- Photovoltaics Services Network
- Potomac Electric Power Company
- Presidio of San Francisco
- Public Service Colorado
- Puget Sound Power and Light Company, Washington
- Sacramento Municipal Utilities District
- Sandia National Laboratories
- Solas Corporation
- Southern California Edison Company
- Springer Electric Cooperative, New Mexico
- State of California, Dept. of Water Resources
- State of California, Office of Energy Assessments
- State of Colorado, Office of Energy Conservation

REPRESENTATIVE CLIENTS (Continued)

- State of Hawaii, Department of Business and Economic Development and Tourism, and Consumer Advocate's Office
- Tri-State G&T Association, Inc., Colorado
- United States Postal Service
- University of Maryland
- University of Wyoming
- Utility PhotoVoltaic Group
- Visa International
- Wells Rural Electric Company, Nevada
- White Mountain Apache Tribe/Fort Apache Timber Company
- Wisconsin Electric Power Company
- U.S. Bureau of Reclamation
- U.S. Department of Agriculture, Forest Service
- U.S. Department of Energy, Federal Energy Management Program
 - Corporation for Solar Technologies and Renewable Resources (CSTRR)
 - US Army Proving Ground
 - Yuma Marine Corps Air Station
 - Luke Air Force Base
 - Arizona National Guard
 - US Army, Fort Irwin
 - Grand Canyon National Park
 - US DOE, Nevada Test Site
- U.S. Department of Energy, Great Lakes Regional Biomass Energy Program
- U.S. Department of Energy, Northeastern Regional Biomass Energy Program
- U.S. Department of Energy, Southeastern Regional Biomass Energy Program
- U.S. Department of Energy, Western Regional Biomass Energy Program
- U.S. Department of Energy, Western Area Power Administration and Member Utilities:
 - Aha Macav Tribal Utility Authority, Arizona
 - Arizona Power Electric Power Cooperative, Arizona
 - Arizona Power Pooling Association, Arizona
 - Arizona Power Authority, Arizona
 - Basin Electric Power Cooperative, North Dakota
 - Bridger Valley Electric Association, Inc., Wyoming
 - Brigham City Light and Power, Utah
 - Buckeye Irrigation District, Arizona
 - Carbon Power and Light Company, Wyoming

REPRESENTATIVE CLIENTS (Continued)

- U.S. Department of Energy, Western Area Power Administration and Member Utilities (continued):
 - Chimney rock Public Power District, Nebraska
 - City of Banning, California
 - City of Biggs Electric Department, California
 - City of Boulder City Electric Department, Nevada
 - City of Bountiful, Utah
 - City of Heber, Utah
 - City of Healdsburg Electric Department, California
 - City of Julesburg Municipal Power & Light, Colorado
 - City of Lodi Municipal Electric System, California
 - City of Logan, Utah
 - City of Lompoc, California
 - City of Manti, Utah
 - City of Marshall, Minnesota
 - City of Mesa Electric Utility, Arizona
 - City of Moorhead Public Service Dept., Minnesota
 - City of Murray Power Department, Utah
 - City of Needles, California
 - City of Page Municipal Utility, Arizona
 - City of Provo Department of Energy, Utah
 - City of Redding Electric Department, California
 - City of Safford Electric Utility, Arizona
 - City of Somerton, Arizona
 - City of St. George, Utah
 - City of Thatcher Municipal Utilities, Arizona
 - City of Ukiah Electric Department, California
 - City of Vernon Municipal Light Dept., California
 - City of Volga Municipal Light & Power Dept., South Dakota
 - City of Wahoo Municipal Light Dept., Nebraska
 - City of Wickenburg Electric Dept., Arizona
 - Colorado River Indian Tribe, Arizona
 - Columbus Electric Cooperative
 - Cooperative Power Association, Minnesota
 - Delta-Montrose Electric Association, Colorado
 - Dixie Escalante Rural Electric Association, Utah
 - East Bay Municipal Utility District, California
 - East River Electric Power Cooperative, South Dakota
 - Electrical District #2, Pinal County, Arizona

REPRESENTATIVE CLIENTS (Continued)

- U.S. Department of Energy, Western Area Power Administration and Member Utilities (continued):
 - Electrical District #4, Pinal County, Arizona
 - Electrical District #8, Maricopa County, Arizona
 - Empire Electric
 - Estes Park Light and Power, Colorado
 - Garkane Power Association, Utah
 - Gunnison County Electric Association, Colorado
 - Heartland Consumers Power District, South Dakota
 - Holy Cross Electric Association, Colorado
 - Hot Springs Rural Electric Association, Inc., Wyoming
 - Imperial Irrigation District, California
 - Intermountain Consumer Power Association
 - Kandiyohi Electric Department, Minnesota
 - Kansas City Board of Public Utilities, Kansas
 - Kansas Electric Power Cooperative, Inc, Kansas
 - Kansas Municipal Energy Agency, Kansas
 - Karnes Electric Cooperative, Inc., Texas
 - KC Electric Association, Inc., Colorado
 - Kit Carson Electric Cooperative, Inc., New Mexico
 - La Plata Electric Association, Inc.
 - Lake Park Municipal Utility, Iowa
 - Lassen Municipal Utility District
 - Lawrence Livermore Laboratories
 - Medina Electric Cooperative
 - Modesto Irrigation District, California
 - Morgan County Rural Electric Association, Colorado
 - Mountain View Electric Association, Inc., Colorado
 - Municipal Energy Agency of Nebraska
 - Navajo Agricultural Products Industry
 - Navopache Electric Cooperative, Arizona
 - Nebraska Public Power District
 - Northern California Power Agency, California
 - North Marin Water District
 - Northwest Rural Public Power District, Nebraska
 - Panhandle Rural Electric Membership Association, Nebraska
 - San Miguel Power Association, Colorado
 - Socorro Electric Cooperative, Inc., New Mexico
 - South Texas Electric Co-Op

REPRESENTATIVE CLIENTS (Continued)

- U.S. Department of Energy, Western Area Power Administration and Member Utilities (continued):
 - Southwestern Power Administration
 - Southeastern Power Administration
 - State of Arizona, Dept. of Commerce, Energy Office
 - State of Nevada, Energy Office
 - State of Utah, Division of Energy
 - Sulpher Springs Valley Electric Cooperative, Inc., Arizona
 - Tohomo O'Odham Utility Authority
 - Town of Center, Colorado
 - Town of Lymon, Nebraska
 - Trinity County Public Utility District
 - Truckee-Donner PUD, California
 - Turlock Irrigation District
 - Utah Associated Municipal Power Systems
 - Valley Electric Association, Nevada
 - Welton-Mohawk Irrigation District, Arizona
 - Wharton County Electric Co-Op, Texas

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VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY (VATECH)

Blacksburg, Alexandria, Falls Church, Virginia

ABOUT VIRGINIA TECH

Since its founding as a land-grant college in 1872, Virginia Polytechnic Institute and State University, popularly known as Virginia Tech, has grown to become the state's largest university. With about 220 degree programs and \$170 million in research projects each year, Virginia Tech is a university of choices and the state's leading research institution. Through its three missions of instruction, research, and public service (outreach), Virginia Tech accomplishes the charge of its motto: "Ut Prosim" – "That I May Serve." That service extends across the commonwealth, the nation, and beyond.

Degree Programs

The university offers about 70 bachelor's degree programs through its seven undergraduate academic colleges:

- College of Agriculture and Life Sciences
- College of Architecture and Urban Studies
- College of Arts and Sciences
- Pamplin College of Business
- College of Engineering
- College of Human Resources and Education
- College of Natural Resources

On the postgraduate level, the university offers about 150 master's and doctoral degree programs through the Graduate School and the Virginia-Maryland Regional College of Veterinary Medicine.

Outreach

The university serves off-campus constituencies - such as community groups, governmental units, and state and local agencies - by providing valuable expertise and training through outreach and international programs. Outreach focus areas include economic development, continuing education, governmental assistance, technology transfer, workforce development, and international research and development.

Virginia Cooperative Extension, jointly operated by Virginia Tech and Virginia State University, provides practical information to the people of the commonwealth to improve their economic, social, and cultural well-being. Extension offices are staffed in 107

locations throughout the state, and programs are financed by federal, state, and local governments.

Enrollment

About 25,500; 85 percent undergraduate students; 15 percent graduate students; 59 percent male; 41 percent female. More than 2 percent of the student body is enrolled in a voluntary corps of cadets, composed of both men and women.

OFFICE OF INTERNATIONAL RESEARCH AND DEVELOPMENT (OIRD)

The Office of International Research and Development (OIRD) at Virginia Tech is the university-wide office within the Outreach Division of the Office of the University Provost charged with sustaining the international mission of the University through management and support of collaborative programs and projects in international research, education, and service. Working primarily through donor-funded projects, OIRD provides international access to the full range of expertise available at Virginia Tech and also to the extensive network of project partners in other universities, the private sector, and research institutes throughout the world. In the last eight years, OIRD has coordinated and managed international contracts and grants in more than 40 countries throughout Asia, Africa, Latin America, the Caribbean, Russia, and Eastern Europe and currently manages a portfolio of about 24 million dollars. The majority of this portfolio is comprised of the United States Agency for International Development (USAID) contracts and grants. In 1997, the national Association of State Universities and Land Grant Colleges ranked Virginia Tech among the top five of all members receiving USAID funds for international projects.

CENTER FOR ENERGY AND GLOBAL ENVIRONMENT (CEAGE)

The mission of the Center is to promote cooperation among diverse environmental groups and to act as a catalyst for developing solutions to environmental problems in many regions of the world. Currently we have active programs with researchers in Bangladesh, China, India, Indonesia, Japan, Krygyzstan (Central Asian Republic), Lebanon, Malaysia, Morocco, Thailand, Tunisia, Turkey and Yemen. Due to their complexity and visible and invisible interactions, the viability and desirability of energy and environmental schemes are examined as much in a political and institutional context as in an economic one. We believe that involving host country researchers from developing countries gives more credibility to our efforts, and the framework that is developed gives policymakers in the U.S. and in other countries a mechanism that is highly relevant. This also allows examinations of a diverse set of alternatives.

In addition to our activities in information transfer, we are very anxious to strengthen Virginia Tech's graduate and undergraduate teaching mission in

several ways. This includes developing courses that raise the level of awareness of our students about the energy and environmental issues in many developing countries, and the social, financial and technical barriers that they face in restoring their environment. As our students become more aware of energy and the global environmental issues worldwide, they will be more competent in dealing the use of information and technology to solve these concerns. Through our linkages world-wide, we facilitate the educational and training objectives of developing country students and industrial trainees.

Successful transfer of technologies and appropriate system operating practices is a key to protecting the global environment and job creation. Dialogues, discussions, interactions, and most importantly, agreements with developing countries are needed to bring about effective technology and skills transfer. For the agreements to be sustained, there must be an understanding at the technical level on the part of the competent and informed people on the both sides of the issue. Without sacrificing power development, environmental safeguards must be enforced.

CEAGE will offer its clients seminars, workshops, joint studies and training activities that do not involve substantial financial commitments. The Center is also willing to conduct these services in the regional countries of Africa, Asia, Latin America and Europe in order to allow broader participation. Institutions in more than 30 countries on six continents have existing linkages with the Center. In addition, other universities and corporate and government research laboratories are liasoned to CEAGE. *These relationships will foster technical discussions and hopefully bring about energy development and use in conjunction with environmental protection.*

CEAGE personnel develop tools to analyze complex and inter-related problems dealing with energy development and its environmental impacts. Since many of the developing countries are expanding their power sector at a much faster rate than the U.S., many unique challenges exist.

Many expanding power systems overseas are new and use advanced technologies. Operated on smaller margins with high reliability, these practices may prove more valuable to the U.S. power industry as it takes efficiency measures to strengthen operations and to improve service.

Since long-term historical data in developing countries is often not available, solutions need not be based on artificial intelligence and expert systems. New analytical techniques must be created to accommodate these scenarios.

EXPERIENCE

The Virginia Tech Office of International Research and Development and Center for Energy and Global Environment is charged with determining environmentally compatible methods of power generation and use in all parts of the world. Please find below our areas of interest and expertise which include:

- Greenhouse and acid rain gas emissions
- Power plant waste generation and disposal
- Electromagnetic field effects
- Advanced generation and storage technologies
- Pre- and post-combustion cleaning technologies
- Electric utility load forecasting
- Solar energy
- Use of energy efficient devices and appliances
- Energy management and conservation
- Demand side management
- Innovative third party power generation
- Infrastructure issues for electric vehicles

FACILITIES

The university has about 100 campus buildings, hundreds of research laboratories, the Corporate Research Center, an airport, 2,600 acres in Blacksburg, and a 1,700-acre research farm in Montgomery County.

Among the university's major facilities are: Carol M. Newman Library, with about 2 million volumes; Donaldson Brown Hotel and Conference Center, a conference center with 125 rooms for guests; Cassell Coliseum (photo) (seating 10,000); Lane Stadium (photo) (seating 51,000); a communications network that provides voice, video, and computer data transmission to offices, classrooms, laboratories, and residence hall rooms; a teleport of satellite dishes for receiving and transmitting; and a computing and communications complex providing the university community with access to information systems and resources worldwide.

Major off-campus facilities include: Hotel Roanoke and Conference Center; the Graduate Center of the Roanoke Valley; the Washington-Alexandria Center of the College of Architecture and Urban Studies; the Virginia Tech/University of Virginia Northern Virginia Center in Falls Church; and the Center for European Studies and Architecture in Switzerland.

Please see attached forms for conference facilities at the Hotel Roanoke Conference Center and the Donaldson Brown Hotel & Conference Center.

RESEARCH

The university conducts a \$170-million-a-year research program, which traditionally places it in the nation's top 50 in terms of research expenditures. More than 3,500 projects pursue new discoveries in agriculture, biotechnology, computer science, engineering, architecture, energy management, and a wide range of other technical and nontechnical fields.

The Virginia Tech Corporate Research Center, located on 120 acres adjacent to campus, offers businesses the opportunity to establish close working relationships with the university.

Conferences, seminars, workshops, short courses in which VATEch have played major roles.

1. **International Symposium on Electric Energy Systems**
Dhaka, BANGLADESH, December 1993
Host Institution: Bangladesh University of Engineering and Technology
2. **"Generation and Use of Electricity and Their Impacts on the Environment"**
Seminar, Bangkok, THAILAND, July 1994
Host Institution: United Nations Economic and Social Commission for Asia and the Pacific
3. **"Global Impression on Electric Power Sector Restructuring"**
Keynote Speeches, Lagos, NIGERIA, January 1995
Host Institution: National Electric Power Authority
4. **"Energy Efficiency Improvements, Renewable Energy and Opportunities for Mitigating GHG Emissions"**
Seminar, Tunis, TUNISIA, March 1995
Host Institution: Societe Tunisienne de L'Electricite et du Gaz
5. **"Private Power in Bangladesh: Prospects and Hidden Problems"**
Seminar, Pittsburgh, Pennsylvania, USA, August 1995
Host Institution: University of Pittsburgh
6. **"Global Electricity Generation and Their Environmental Impacts"**
Seminar, Calcutta, INDIA, November 1995
Host Institution: Jadaipur University
7. **"Electric Energy, Environment and Demand Side Management"**
Seminar, Kuala Lumpur, MALAYSIA, November 1995
Host Institution: University Technology Malaysia
8. **IEEE International Conference on Electricity Sector Development and Demand Side Management**
Kuala Lumpur, MALAYSIA, November 1995
Host Institution: University Technology Malaysia

9. **Third General Congress and S & T Meeting**
 Tunis, **TUNISIA**, 16-22 June 1996
 Host Institution: Tunisian Scientific Society

INTERNATIONAL SUPPORT

Virginia Tech has developed an extensive network with a number of premier universities/institutions across the global, which will foster technical discussions and hopefully bring about energy development and use in conjunction with environmental protection.

Australia	University of Western Australia, Nedlands
Australia	University of Victoria, Melbourne
Bangladesh	Bangladesh University of Engineering and Technology, Dhaka
Canada	University of Calgary, Calgary
China	Shandong University of Technology, Jinan
Croatia	University of Zagreb, Zagreb
France	Insitut Nationale Polytechnique de Grenoble, Grenoble
Hong Kong	Hong Kong Polytechnic, Hong Kong
India	Jadavpur University, Calcutta
India	Regional Engineering College, Rourkela
Indonesia	University of Indonesia, Jakarta
Japan	Tokyo Electric Power Company, Tokyo
Japan	Kumamoto University, Kumamoto City
Kyrgyzstan	Kyrgyz Technical University, Bishkek
Korea	Seoul National University, Seoul
Lebanon	American University of Beirut, Beirut
Malaysia	Asia Pacific Development Center, Kuala Lumpur
Malaysia	University Technology Malaysia, Kuala Lumpur
Morocco	Universite Hassan II, ENSEM, Casablanca
Nigeria	Enugu State University, Enugu
Pakistan	University of Engineering & Technology, Taxilla
Pakistan	University of Engineering & Technology, Lahore
Philippines	University of the Philippines, Diliman
Singapore	Nanyang Technological University
South Africa	University of Capetown, Capetown
Spain	University Pontificia Comillas, Madrid
Switzerland	Ecole Polytechnique Federale de Lausanne, Lausanne
Taiwan	National Taiwan Institute of Technology, Taipei
Thailand	Asian Institute of Technology, Bangkok
Tunisia	Ecole National d'Ingenieur de Tunis, Tunis
Turkey	Bogazici University, Istanbul

Proposed Research Topics

The RFP provided five suggested topics for the respective research forums. We have commented on them below:

- *Analysis of vulnerability of India to global climate change and its impacts on the planned economic development.* This topic would be more appropriate for the forum to be held in India.
- *Development of a strategy and implementation framework for directing potential foreign investments for GHG emissions reduction activities into areas of critical importance for economic or social development.* This would be an appropriate topic for a VT-sponsored forum. For such a forum we suggest inviting only government and academic experts in the field, but also representatives of US companies who can provide the technology necessary to achieve emissions reductions.
- *Development of methodologies to evaluate trade-offs between mitigation and adaptation strategies and establishing needed infrastructure changes to limit or adapt to climate change.* This would be an appropriate topic for a VT-sponsored forum if the topic remains general. If the topic is specific to adaptation or mitigation in India, then India may be better venue for this forum. We suggest an invitation of experts participating in the US Global Change Research Program.
- *Assessment of potential neutral power sector growth for India through a combined strategy including development of carbon sinks, renewable energy and highly efficient fossil fuel conversion technologies.* This topic would be appropriate for an India forum or for a forum at Virginia Tech. Energy Efficiency is an important component to such a forum. Virginia Tech has several options for campus sponsors of this forum. We suggest including delegates that represent companies who have off-the-shelf- efficient fuel conversion technologies and renewable energy technologies.
- *Review and Assess the development and deployment of various policy instruments and its impact on carbon emissions growth rate. This topic would be appropriate for a VT-sponsored forum.* The Waste Policy Institute, Virginia Tech firm, proposed to sponsor senior policy forms and would be appropriate to carry out this task. We propose invitations to the appropriate representatives of the US EPA.



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International Research and Development

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Fax 9-1-202-331-1058
(3 Pages)

27 July 2000

Mr. Erik Brejla, US Program Manager
Greenhouse Gas Pollution Prevention Project
The Louis Berger Group Inc.
1819 H St. NW
Washington DC 20006

Dear Erik:

In response to USAID/India's request for information on forum topics, please accept the following information. If USAID/India need's further information, please let me know and we will try to supply it promptly.

Our concept for running greenhouse gas policy and technology forums is to invite leaders in the field from around the country to Virginia Tech, not to load the forum with faculty from Virginia Tech. We will recruit certain departments to organize and proceed over forum activities. We suggest holding discussions on more than one topic simultaneously at the same venue. These forum topics have areas of overlap and, as facilitators, we at Virginia Tech believe an important cross-fertilization of ideas will take place by bringing together experts from different disciplines. By using such an approach Virginia Tech can present world-class forums that promote the objectives of the GEP project and also highlight Virginia Tech as a participant in the undertaking.

We anticipate four university entities that could participate in holding such forums: the Institute for Environmental and Energy Studies of the Department of Political Science, the Department of Urban Affairs and Planning, the Center for Global Energy and the Environment, and the Energy Management Institute.

The RFP provided five suggested topic for forums. We comment on them below.

Analysis of vulnerability of India to global climate change and its impacts on the planned economic development. This topic would be more appropriate for the forum to be held in India.

Development of a strategy and implementation framework for directing potential foreign investments for GHG emissions reduction activities into areas of critical importance for economic or social development. This would be an appropriate topic for a VT-sponsored forum. For such a forum we suggest inviting not only government and academic experts in the field, but also representatives of US companies who can provide the technology necessary to achieve emissions reductions.

Development of methodologies to evaluate trade-off between mitigation and adaptation strategies and establishing needed infrastructure changes to limit or adapt to climate change. This would be an appropriate topic for a VT-sponsored forum if the topic remains general. If the topic is specific to adaptation or mitigation in India, then India may be a better venue for this forum. We suggest invitation of experts participating in the US Global Change Research Program.

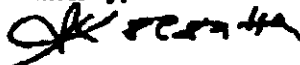
Assessment of potential carbon neutral power sector growth for India through a combined strategy including development of carbon sinks, renewable energy and highly efficient fossil fuel conversion technologies. This topic would be appropriate for an India forum or for a forum at Virginia Tech. Energy efficiency is an important component to such a forum. Virginia Tech has several options for campus sponsors of this forum. We suggest including delegates that represent companies who have off-the-shelf efficient fuel conversion technologies and renewable energy technologies.

Review and assess the development and deployment of various policy instruments and its impact on carbon emissions growth rates. This topic would be appropriate for a VT-sponsored forum. The Waste Policy Institute proposed to sponsor senior policy forums and would be appropriate to carry out this task. We propose invitation of representatives from the US EPA.

Dr. Saifur Rahman of the CEAGE has expressed interest in moderating discussions on topics 3,4, or 5. Dr. Richard Rich of the Department of Political Science is also interested in considering hosting discussions on one of the topics. He has requested more details from us on the forum and we will be discussing things further when he returns to Blacksburg in mid-August. A brief bio of Dr. Rich is attached at the end of this letter.

Warm regards.

Sincerely,



Dr. S.K. De Datta
Director, Office of International Research and
Development, Associate Dean, College of Agriculture
and Life Sciences, Virginia Tech
dedatta@vt.edu

cc: Clark Jones, Vice Provost for Outreach
Saifur Rahman, Director, CEAGE
Richard Rich, Head, Dept. of Political Science
John Randolph, Head, Dept. of Urban Affairs and Planning
Larry Vaughan, Special Assistant to the Director, OIRD
Jason Jennings, Fiscal Technician Senior, OIRD

Professor Richard C. Rich is Chair of the Department of Political Science at Virginia Tech and will soon take leadership of the new Institute for Environmental and Energy Studies at Tech. He has conducted a variety of research on environmental policies for the U.S. EPA, and has consulted with federal, state, and local governments and nonprofit organizations on strategies for effective environmental decision-making, hazardous materials management, risk communication, and emergency response planning. His recent honors include being selected as an officer in the International Society for Risk Analysis, receiving the Aaron Wildavsky Award from the Policy Studies Organization for his contributions to policy analysis, and being named to the National Council for Science and the Environment. He was coeditor of *Hazardous Materials Dialogue* and is currently a member of the Virginia Governor's environmental education task force, and he organized a national conference on community sustainability that was held in Roanoke this June. He just returned from serving as one of four U.S. Delegates to the "Urban 21: Global Congress on the Future of the World's Cities" in Berlin, Germany.

**Virginia Tech Capability Statement for the Supplement to USAID/India's
Greenhouse Gas Pollution Prevention Project.**

***Office of International Research and Development
(OIRD)***

(Outreach Division of the Office of the University Provost)

All colleges and departments at Virginia Tech are committed to internationalizing the University, and strive to build upon the extensive international experience and skills of their faculty. Nationally and internationally ranked programs in engineering, business, agriculture, tourism, and urban affairs are strengthened through faculty contributions to international projects and programs. Although faculty experience and expertise extend to all regions of the world, exceptional strength in Sub-Saharan Africa and South and Eastern Asia is evident.

In addition to the departments of a traditional university, Virginia Tech's drive to commit its intellectual resources to tackle real-world problems has led to the formation of many Centers and university-associated Institutes. The University hosts five institutes in the energy sector and two in the transportation sector:

Energy

- Center for Coal and Minerals Processing
- Center for Energy and the Global Environment
- Center for Power Electronic Systems
- Energy Management Institute
- Virginia Center for Coal and Energy Research.

Transportation

- Center for Transportation Research
- Center for Automotive Fuel Cell Systems

Issues related to energy and the environment draw upon the expertise and interests of individuals doing research in engineering, chemistry, biology, forestry, agriculture, urban affairs, and planning:

- Dr. Roe-Hoan Yoon, Director of the Center for Coal and Minerals Processing (CCMP), leads a team working on the development of the triboelectrostatic coal cleaning technology funded by the U.S. Department of Energy. This process is capable of cleaning coal without using water, which is ideally suited for removing various impurities from Indian coal in the regions where water is a scarce resource. Indian coal has very high levels of impurities that significantly reduces combustion efficiency and creates significant pollution. Because water is a limiting resource in India, the conventional water-based coal cleaning technologies are difficult to apply.

Dr. Yoon's has colleagues in the Regional Research Laboratory (CSIR) in Bhopal, India who are interested in implementing this kind of coal cleaning technology in India.

- Teams from Virginia Tech's Energy Management Institute (EMI) travel around the world working with industry to increase the energy efficiency of operations and to train personnel in energy audit techniques.
- The Center for Energy and the Global Environment (CEAGE), led by Dr. Saifur Rahman, provides international expertise on reducing greenhouse gas emissions. The CEAGE carries out international technical assistance and education regarding the interrelationships between the social, financial, and technical aspects of the greenhouse gas reduction efforts.

The university is also proud to be affiliated with the Waste Policy Institute (WPI). WPI is providing broad-based technical assistance to the US Department of Energy's National Environmental Technology Laboratory (NETL) Global Climate Change Initiative. WPI is working closely with NETL to develop analytical tools, economic models, information products, and communications capabilities to improve the quality of energy technology and technology diffusion data. These efforts have resulted in validated methods for enhancing the consistency, quality and credibility of data and information products dealing with fossil energy technology applications, their greenhouse gas emissions, and potential global climate change. Under an interagency agreement between EPA and NETL, WPI developed a variety of communications and public outreach products in support of EPA's mandate to increase public awareness about the science of climate change. As a full-service public outreach consultant, WPI also played a major role in support of EPA's global climate change regional workshops and stakeholder roundtable discussions.

The technical talent and experience of these above-mentioned Virginia Tech entities, in addition to the engineers and scientists in Virginia Tech's traditional departments, represent a deep resource pool from which Louis Berger International can draw for the implementation of the Supplement to the Greenhouse Gas Pollution Prevention Project.

The Office of International Research and Development

The Office of International Research and Development (OIRD) at Virginia Tech is the university-wide office within the Outreach Division of the Office of the University Provost that is charged with sustaining the international mission of the University through management and support of collaborative programs and projects in international research, education, training, and technical assistance. OIRD is largely responsible for Virginia Tech's excellent reputation at USAID for project management, implementation, and fiscal responsibility.

OIRD is the nexus for project partners throughout the world to access Virginia Tech's expertise. OIRD embodies the university's institutional experience in carrying out USAID-funded activities. In the last six years, OIRD has coordinated and managed international contracts and grants in more than 27 countries throughout Asia, Africa, Latin America, the Caribbean, Russia, and Eastern Europe. OIRD currently manages a portfolio of \$22.5 million dollars. The majority of this portfolio comprises USAID contracts and grants. In 1997, the National Association of State Universities and Land Grant Colleges (NASULGC) ranked Virginia Tech among the top five of all members receiving USAID funds for international agricultural projects. In the Greenhouse Gas Pollution Prevention Project Supplement, OIRD will serve Louis Berger International as Virginia Tech's experienced, reliable management liaison.

The highly experienced, multilingual, and multidisciplinary faculty of OIRD is unique among international programs offices of the US Land-Grant university system. The nine full-time faculty comprise an economist, a rural sociologist, an anthropologist/Women in International Development (WID) specialist, an agronomist, a plant breeder, a biologist, an entomologist, a horticulturist, and an editor/technical writer. The OIRD faculty works directly with university faculty in other disciplines throughout the university and at other institutions to serve the technical and administrative requirements of international project implementation in any discipline. The six-member OIRD staff contends daily with the financial responsibilities of USAID-funded activities and provides logistical backstopping for faculty and project consultants. The OIRD Director, Dr. S.K. De Datta, is a highly accomplished scientist and administrator with more than 35 years of international experience, including India and many other countries of South and Southeast Asia. Dr. De Datta also serves as Associate Dean in the College of Agriculture and Life Sciences.

The Alexandria Research Institute

Virginia Tech established the Alexandria Research Institute (ARI) in the fall of 1998 as a northern Virginia research campus for the College of Engineering, with resident faculty and graduate student researchers from eight departments. Thus, ARI provides an intellectual environment for cross-fertilization among diverse engineering fields. Of particular relevance to this project are two multi-disciplinary research centers represented by ARI: the Center for Energy and the Global Environment (CEAGE) and the Virginia Center for Coal and Energy Research (VCCER). The ARI also is located within convenient transit distance of key Federal agencies for which this project is relevant, including the U.S. Department of Energy, the U.S. Agency for International Development, and the U.S. Trade and Development Administration. ARI's location also provides ready access to foreign embassies and consulates, as well as the World Bank and other multi-national lending organizations.

Center for Energy and the Global Environment, CEAGE.

The Center for Energy and the Global Environment brings together faculty members and students from six Virginia Tech departments to study and facilitate the implementation of

cost-effective means of generating and using energy with minimal environmental impact. The challenges of energy development and environmental sustainability are global in nature. Consequently, international partnerships are needed, with mutual agreement on policies and projects. Such agreements can be effective, however, only if steps are taken to ensure that transfer of technologies and associated operation and management practices are appropriate to the natural environment and societal needs of the countries in which they are implemented.

CEAGE programs are guided by discussions with the U.S. energy industry and regulatory bodies and informed by visits to and contacts with Africa, Asia, Latin America and the newly emerging economies of Eastern Europe. Based on such discussions, our objective is to assemble needed information and make it available to our clients. Thus, CEAGE focuses on disseminating appropriate and available knowledge.

CEAGE offers seminars, workshops, joint studies, and training programs without the burden of heavy financial commitment from our clients by conducting these activities in the client's country. Three such seminars and workshops have recently been held in Bangladesh, Malaysia and Tunisia (see CV of Saifur Rahman for details). We also sponsor visits by international researchers and policymakers to work at our Center and collaborate with them in formulating environmentally friendly projects and policies for their countries. Finally, we produce white papers on topics related to energy and the environment worldwide and make them available to the popular news media as well as research publications. Recently, *Dhaka Courier*, a leading weekly newsmagazine in Bangladesh, published a three-part series of articles on power sector development in Bangladesh, authored by Dr. Rahman, the Director of CEAGE.

CEAGE research focuses on the development of tools to analyze the design of energy efficiency and renewable energy systems, optimizing for lowest life-cycle cost to meet economic development needs within appropriate environmental constraints. With frequent, costly, and widespread electric power outages, improving the supply of energy in general, and electricity in particular, is a major concern among regional governments. In order to accomplish this goal, South Asia must diversify its energy supply and expand the use of indigenous renewable energy resources, promote additional foreign investment for power generation projects, as well as improve the efficiency of energy transmission, distribution, and end-use. Government policies are now evolving to reform and privatize the power supply sector, and to expand regional, cross-border energy trade and investment.

Energy Management Institute

The purpose of the Technical Assistance branch of the Energy Management Institute (EMI) is to provide industry with expertise to address process energy concerns. EMI addresses these needs in three main ways:

- energy surveys
- training
- technical assistance

Energy surveys involve an on-site evaluation of energy intensive processes. Savings or improvement potential are determined with the most promising options being investigated in greater detail. EMI has conducted more than sixty energy surveys for industrial clients on six continents. The energy surveyors of EMI are all professors at Virginia Tech who teach thermodynamics and energy related courses. But these professors also have significant industrial experience. This combination of plant experience and classroom expertise uniquely qualifies EMI personnel as instructors in an industrial classroom.

Short courses tailored to general industrial needs as well as specific plant requirements provide the fundamental information of the operation of energy systems such as boilers, steam systems, cogeneration, compressed air, industrial refrigeration, industrial HVAC and electric motors. Each course not only focuses on the fundamentals of operation but the primary methods of efficiency improvement along with maintenance concerns. Courses taught to-date have ranged from broad based, general energy management for typical industrial plants, to detailed courses on compressed air systems or steam systems. More importantly, the training does not end in the classroom. The survey team explains all aspects of their analysis while in the field conducting surveys.

EMI's technical assistance focuses on individual process areas. Acute performance improvement and long term strategies are addressed. Preliminary design and project scope are provided as well as interaction with suppliers. Because the surveyors of EMI all have a significant history of plant experience, they are acquainted with the interrelation of the utility systems and process requirements. The connection between utility systems and the process can influence product throughput and quality. Generally, if the process output can be improved the benefits will be significant.

The training and technical assistance activities of EMI staff have resulted in real world impacts. For example, EMI's work with Mobil Oil Company for over four years and has aided in producing over \$103,000,000 per year in energy savings from projects with a payback of less than two years.

Waste Policy Institute

WPI has a breadth of experience conducting senior-level policy roundtables that have domestic and international implications, promote interactions with key stakeholders and industrial sectors, and produce voluntary technical and public policy responses to combat environmental hazards and pollution. Representative activities include support of the White House Office of Science and Technology Policy (OSTP) National Science and Technology Council (NSTC); the formative deliberations of an interagency environmental technology initiative that has evolved into the White House Council on Environmental Quality's Interagency Environmental Technology Office; the White House's Technology for a Sustainable Future industry workshops; the 1994 White House Conference on Environmental Technology; and the U.S. Environmental Protection Agency (EPA) Office of Policy regional

workshops and roundtables focused on global climate change impacts, solutions, and federal voluntary programs.

In addition, WPI is currently supporting the U.S. Department of Energy (DOE) by providing energy policymakers and technology developers with broad-based technical assistance through the National Energy Technology Laboratory (NETL) Global Climate Change Initiative. NETL is the federal energy research center focused on advancing fossil energy technology systems to solve energy and environmental problems. WPI is working closely with NETL technical staff and federal policymakers to develop analytical tools, economic models, information products, and communications capabilities (e.g., Internet-based information clearinghouse and decision support center) to improve the quality of energy technology and technology diffusion data.

Current efforts are yielding validated methods for enhancing the consistency, quality and credibility of data and information products dealing with fossil energy technology applications, their greenhouse gas emissions, and potential global climate change and other environmental consequences (e.g., Clean Air Act compliance issues). In short, WPI technical assistance is focused on energy technology diffusion/adoption studies and models; fossil energy technology R&D program evaluation; life cycle assessments; economic and environmental computer modeling and validation; and international emissions credit trading program analysis, validation and verification.

Additional relevant WPI senior policy level support experiences are captured in brief below:

- The EPA Office of Policy convened a Regional Climate Coordinators Workshop in March of 1999 to develop a unified program for communicating the risks of climate change and opportunities to achieve greenhouse gas reductions. WPI provided technical support to roundtable discussions focused on ways to coordinate the EPA public outreach and technical assistance efforts nationally and regionally within the United States. In support of these efforts, WPI drafted an integrated action plan detailing potential EPA roles, responsibilities, and implementation activities. This integrated action plan provided strategies and individual steps to enable policymakers to encourage national, regional, state, and industry efforts to reduce greenhouse gas inventories and the potential for global climate change.
- A senior policy level roundtable hosted by EPA in June of 1998. Decision-makers attending the policy roundtable included federal, state and local government, and NGO representatives. Major themes addressed during the discussion included: growing concerns U.S. states have about the Kyoto Protocol; concerns about unilateral U.S. action; and approaches to educating local officials and promoting policy dialogue between elected officials, government organizations, and their constituencies.
- To measure program performance of EPA's State and Local Climate Change Program, WPI worked with agency representatives to establish weighted criteria for assessing individual projects and grading overall program success. In addition, WPI initiated the

development of tracking systems to monitor state and local policymaker involvement in federal voluntary programs. These data allow EPA officials to capture state and local government accomplishments on both a quantitative and qualitative level and to provide recognition and incentives for developing and adopting best practices for reducing greenhouse gas emissions. WPI developed tools and methodologies to continuously monitor, periodically assess, and ultimately quantify program investments (e.g., state and local greenhouse gas inventory activities, action plans, and other forms of analytical and technical assistance to state and local government policy makers).

- WPI worked with EPA in Fiscal Years 1999 and 2000 to initiate a series of state climate change meetings involving federal, state, and local policymakers, non-governmental organizations, and private-sector entities potentially impacted by greenhouse gases and global climate change. These meetings were launched in Florida and successful components will be replicated or expanded in policy dialogue meetings in other U.S. states and regions. WPI designed these meetings and senior policy roundtables that were held in conjunction with these dialogue activities. Their fundamental purpose was to engage state decision-makers in an open discussion concerning the positive impacts of reducing greenhouse gas emissions. These policy roundtables focus on opportunities for stakeholders to take voluntary action to reduce greenhouse gas emissions within their jurisdictions and organizations.
- States and localities have regulatory authority over many direct and indirect sources of greenhouse gas emissions including land-use planning and 'smart growth' initiatives; zoning, landfills, and building codes; and transportation planning and management. WPI provided a breadth of communications and outreach products and facilitation services to EPA to enable information sharing between and among states and localities considering voluntary responses to climate change risks. WPI worked closely with EPA representatives to introduce state and local government policymakers to the issue of climate change, its impacts and potential solutions and provide public outreach and technical assistance to government partners focusing resources and agency responses on voluntarily reducing greenhouse gas emissions. Such efforts enabled EPA's state and municipal government partners to integrate climate change concerns and response plans into existing programs structured to meet air quality standards for currently regulated pollutants.
- Senior representatives of the White House Climate Change task force requested a "toolkit" of program initiatives to help state agencies advance constituency awareness of climate change issues and voluntary response opportunities. WPI played a leading role in developing the *Climate Change Outreach Toolkit for State and Local Officials*. Designed for leaders from state and local agencies, this communications product provides numerous public outreach materials to help state and local government authorities effectively describe climate change science and risks in plain English. Representative communications products included fact sheets on net metering, renewables portfolio standards, state energy codes, statewide recycling, alternative fuel vehicles, biomass

power, fertilizer management, geothermal heat pumps, and landfill methane recovery. The focus of WPI's communications and facilitation support included: building relationships with states to encourage voluntary actions on climate change and clean air initiatives and leverage actions with businesses, industries, communities and other organizations; developing and disseminating information that assists states in understanding and educating the public about the links between energy use, air pollution, climate change and economic viability; and determining whether energy efficiency and renewable energy initiatives can be effectively incorporated in to state air quality planning.

Department of Biosystems Engineering

The development of biofuels technology will contribute significantly towards reduction of carbon dioxide, and sequestration of carbon. The production of biofuel may involve thermal, biological, thermochemical, or biochemical processing of biomass feedstocks. The choice of technology is often dictated by the economic and environmental needs of the community. If developed in a sustainable manner, biofuels are greenhouse gas neutral.

Virginia Tech has an interdisciplinary technology development group in solid state fermentation of waste streams to produce hydrogen, methane, and ethanol as well as experience in thermal gasification of coal. The biofuels group comprises five faculty members: Foster Agblevor (Biosystems Engineering) – anaerobic fermentation; Dennis Jaasma (Mechanical Engineering) – coal combustion; Michael Von Spakovsky (Mechanical Engineering) – fuel cells; Al Kornhauser (Mechanical Engineering) – plant design. The diversity and expertise of the Virginia Tech faculty has positioned the University to be a leader in bioconversion research, instruction, and outreach.

Transportation Group

The Transportation Program at Virginia Tech is among the top ten university programs in the nation. It has more than 27 active faculty conducting teaching and research in the field of transportation. The major focus areas related to this greenhouse gas project supplement are: 1) the transportation infrastructure group dealing with the design and management of transportation facilities (nine faculty members), 2) the transportation environmental group dealing with fixed and mobile sources of emissions (seven faculty members), and transportation policy group dealing with the social and economic implications of certain policies on transportation services and facilities (five faculty members).

For this proposal, the Transportation Group is represented by two faculty members working in the management and operation of transportation facilities. Dr. Antoine Hobeika and Dr. John Collura from the Department of Civil Engineering collectively bring 55 years of experience in transportation engineering. Dr. Hobeika has extensive experience in international transportation problems, some of which while employed by Louis Berger International.

Center for Coal and Minerals Processing

The goals of the CCMP are to develop new technologies for processing minerals and coal, help companies improve their existing plant operations, and offer training courses for industrial personnel. Major activities include development of technologies for column flotation, fine coal dewatering, triboelectrostatic separation, hydroclassification, process control, hazardous waste treatment and recycling, and process modeling and simulation. The Microcel flotation columns developed by the Center are widely used in industry for cleaning fine coal, upgrading iron and base-metal ores, and purifying kaolin clay. Companies in the US, Australia, China, Sweden, Spain, Korea, and Chile use the Microcel flotation technology to improve air quality from coal combustion.

Virginia Center for Coal and Energy Research (VCCER).

The VCCER was created as an interdisciplinary study, research, information, and resource facility for the Commonwealth of Virginia. It is a Virginia Tech Center encompassing the three missions of the university – instruction, research, and outreach.

Typical areas of study include environmental effects, mining systems, coal transportation, renewable energy sources, energy efficiency, socioeconomic effects, and technological advances. The Center is developing new programs addressing energy trends, coal tax-credit effectiveness, environmental impacts of energy resources extraction and utilization, public policy issues related to energy, marketing and transportation of coal, integration of high technology in systems design and education, international energy development and issues related to deregulation. Among its innovative training activities is the creation of training programs in mining-related industrial education using inexpensive virtual reality technology with desktop personal computers. This expertise will be brought to bear in development of cost-effective instruction for greenhouse gas monitoring.

With offices on the main campus in Blacksburg and at Virginia Tech's Alexandria Research Institute in Alexandria, the VCCER is poised to respond to state, national, and international energy research needs. The center has excellent access to laboratory facilities through the campus in Blacksburg. The proximity of Alexandria to the nation's capital provides the center with government contacts and other corporate associates.

WORLD RESOURCES INSTITUTE (WRI)

Washington D.C.

ABOUT THE WORLD RESOURCES INSTITUTE

World Resources Institute provides information, ideas, and solutions to global environmental problems.

Our mission is to move human society to live in ways that protect Earth's environment for current and future generations.

Our program meets global challenges by using knowledge to catalyze public and private action.

Our goals are to:

- **Reverse the rapid degradation of ecosystems**, assuring their capacity to provide the goods and services on which human well-being depends.
- **Halt the changes to the Earth's climate** caused by human activity.
- **Catalyze the adoption of policies and practices that expand prosperity** while reducing the use of materials and generation of wastes.
- **Guarantee people's access to information and decisions** regarding natural resources and environment.

ORGANIZATION STRUCTURE

The World Resources Institute is structured into 6 diverse programmic areas.

Biodiversity

Featuring information on the diversity of biological resources, ecosystems, and bioregional management.

Business and Industry

Helping companies improve environmental quality through business success.

Climate Change

Identifying opportunities to reduce the risk of global climate change in ways that drive sustainable economic development worldwide.

Forests

This site focuses on the value and management of temperate, boreal, and tropical forest resources and includes information about our Forest Frontiers Initiative and Global Forest Watch.

Health

This site explores the interaction among large-scale environmental, development, and demographic changes with human disease and assesses policy options to reduce human risks.

Governance

The Governance Program focuses primarily on the environmental governance challenges faced by developing and transition countries as they promote sustainable development at the national level and seek equal participation in international policy arenas.

Sustainable Agriculture

Highlighting the opportunities for resource-conserving agricultural practices and the impacts of agriculture policy reform on taxes, farm income, human health, and the environment.

EXPERIENCE

"Reducing the risk of climate change in ways that drive sustainable economic development worldwide." Climate change is a global problem that, if unaddressed, could undermine progress on every aspect of human development and ecosystem protection, including built infrastructure, food production, biodiversity, human health, and the natural systems that support growing economies.

Effective policies to prevent climate change, however, will set the world on a new course, one characterized by cleaner energy sources, healthier ecosystems and societies, technological innovation, and economic opportunity.

WRI's core climate efforts, are clustered around three strategies:

- **Engage the private sector**

WRI's Climate Protection Initiative (CPI) works to accelerate the business community's acceptance of climate change as a real, manageable problem as well as encourage innovative private sector solutions.

Will we ever run out of oil? When is global production likely to peak?

How can we track greenhouse gas (GHG) emissions from businesses and similar entities?

- **Developing country partnerships**

WRI works to contribute to developing countries' effectiveness in negotiating and implementing the climate treaty;

- Reducing the energy and carbon intensity of their development paths to gain benefits from reduced local and regional air pollution and increased economic and energy efficiency; and
- Capturing benefits of carbon sequestration, through sustainable forestry and agricultural practices.

- **Rules of the game**

WRI identifies and promotes new rules of the game for financing sustainable development and for climate treaty implementation, particularly in the creation of innovative and effective policy mechanisms such as emissions trading and the Clean Development Mechanism of the Kyoto Protocol.

WRI "GREEN" CONFERENCE FACILITIES

WRI believes a healthy environment and a healthy economy can coexist. Since our founding in 1982, we have used information and knowledge as tools to fulfill our mission: to move human society to live in ways that protect earth's environment and its capacity to provide for the needs and aspirations of current and future generations.

Our relocation to 10 G Street, NE, in March 1999, presented an opportunity to create an office environment that expresses our mission intangible terms, through environmentally-friendly design, facilities, and technology. The workspace, designed by the architectural firm Hellmuth, Obata, and Kassabaum, PC, is a real-life example of strategic environmental and business management. HOK designer Sandy Mendler says, "Through smarter design, we're creating environments that really are better for people."

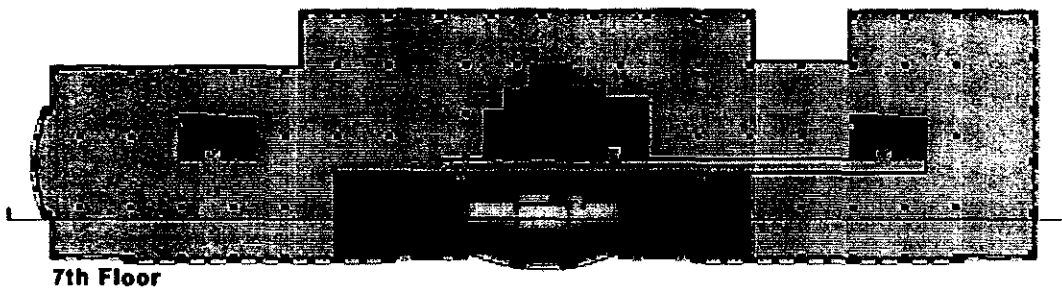
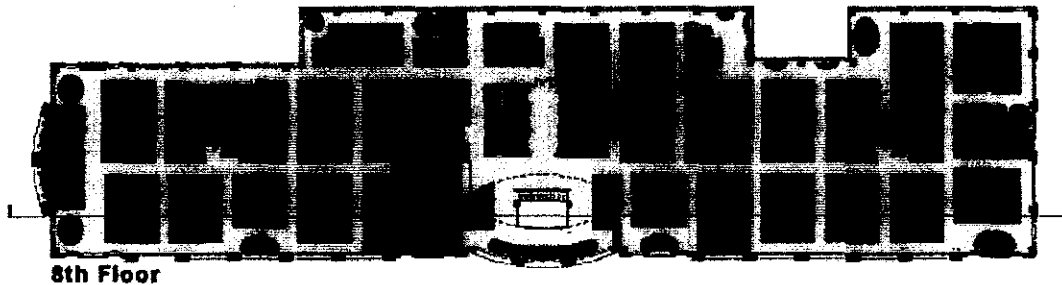
The design is built within a conventional leased office space and within a standard budget, but it makes some intelligent choices that use resources efficiently and deal with waste constructively. And it takes advantage of new technologies to facilitate communication among staff, visitors, and collaborators.

WRI is moving toward greater sustainability by using natural, recycled, low-energy, and non-toxic components in doors, walls, ceilings, floors, woodwork, furniture, lighting, and kitchen appliances.

WRI's work focuses on four themes: biological resource stewardship, climate protection, equitable development, and sustainable enterprise. The materials that were chosen in the project reflect our commitment to these themes.

Much of the focus in the planning of the new office was on energy efficiency -- in the type of lighting and appliances selected, and the use of sensors and smart controls that cut off or reduce the power supply when products are not in use. Paints and finishes,

countertops and flooring, cabinets and carpeting were all chosen for their environmentally-friendly manufacturing processes. Videoconferencing technologies reduce the need for collaborators to travel, which helps to reduce energy demands and carbon dioxide emissions



RESEARCH DONE

The following are a list of some of WRI's Climate Programs publications/papers:

- *Designing the Clean Development Mechanism: Operational and Institutional Issues*. Prepared for the OECD Climate Forum. May 2000
- *How Much Sustainable Development Can We Expect From the Clean Development Mechanism?* November 1999
- *What Might a Developing Country Climate Commitment Look Like?* May 1999
- *Promoting Development While Limiting Greenhouse Gas Emissions: Trends and Baselines*. April 1999 (WRI and UNDP)

- *The Clean Development Mechanism: Draft Working Papers*. October 1998 (CSDA, FIELD and WRI)
- *Contributions to Climate Change: Are Conventional Metrics Misleading the Debate?* October 1998
- *Are Developing Countries Already Doing as Much as Industrialized Countries to Slow Climate Change?* July 1997

KEY PERSONNEL

Dr. Nancy Kete is the Director of the Climate, Energy and Pollution Program at the World Resources Institute. Dr. Kete recently joined WRI from the U.S. Environmental Protection Agency where she was Deputy Director of the Office of Atmospheric Programs.

An expert on energy and environmental problems and the use of economic instruments for environmental protection, she has been responsible for the development and analysis of domestic and international climate change policy options, as well as voluntary energy efficiency and other greenhouse gas mitigation programs. During her career at EPA, she worked as Senior Policy Analyst in the Office of Air and Radiation from 1987 to 1991, where she was responsible for issues related to the energy sector and air pollution policy. While in that position, she led the EPA team responsible for the acid rain control provisions of the 1990 Clean Air Act Amendments, which represented the first large scale practical applications of a tradable emissions program.

Her other experience includes serving as the Science Advisor for Environmental Affairs at the U.S. Mission to the Organization for Economic Cooperation and Development (OECD) in Paris, where she also served as co-chair of the OECD Joint Experts Group on Trade and Environment. She has also worked as acting administrator of Economic Studies for the Power Plant Siting Program in Maryland's Department of Natural Resources. Dr. Kete holds a Ph.D. from the department of geography and environmental engineering at the Johns Hopkins University and a B.S. in geography from Southern Illinois University.

Kevin Baumert is an associate in WRI's Climate, Energy and Pollution (CEP) program. His research focuses on the Kyoto Protocol and climate change policy instruments, including emissions trading and the Clean Development Mechanism. Mr Baumert is an author of several WRI reports and papers:

- *"What Might a Developing Country Climate Commitment Look Like?"* (with Ruchi Bhandari and Nancy Kete);
- *"Capacity for Climate: Economies in Transition After Kyoto"* (with Elena Petkova); and
- *"The Clean Development Mechanism: Understanding Additionality."*

Prior to joining WRI, he received a B.A. in Economics from the University of Notre Dame and a Masters degree from Columbia University's School of International and Public Affairs.

Ruchi Bhandari is a Program Analyst in the Climate, Energy and Pollution Program of the World Resources Institute (WRI). She is currently working on the spectrum of private and public capital flows entering developing country economies and its implications on climate change. Her previous research includes developing an indicator to support identification of appropriate developing country participation to reduce greenhouse gas emissions and the impacts of air pollution on human health. Prior to WRI, Ms. Bhandari worked in India on social and environmental issues connected to food and nutrition security, forming rural micro-credit societies, generating income opportunities for rural women, and organizing and mobilizing funds for non-governmental organizations (NGOs). She holds a Master of Business Administration and Master of Arts from the University of Rajasthan, India.

She is a co-author of the WRI papers:

- 2000. *The climate of export credit agencies* (with Cresencia Maurer);
- 1999. *What might a developing country climate commitment look like?* (with Kevin Baumert and Nancy Kete);

Frances Irwin is a Fellow in the Climate, Energy, and Pollution Program at the World Resources Institute (WRI). She manages the Electronics Leadership project and is a member of the team working on indicators of material flows. She previously directed the Pollution Prevention Program at the World Wildlife Fund and was a senior associate at The Conservation Foundation.

Ms. Irwin received a bachelor's degree in history from The College of Wooster and a master's degree in international relations from The Fletcher School of Law and Diplomacy.

Dr. Jim MacKenzie, since 1986, has been a Senior Associate in WRI's Program in Climate, Energy and Pollution. He is author or co-author of numerous books and studies on transportation (including climate impacts, financial subsidies, electric cars, and impacts on US culture), climate change, energy security, acid rain and its impacts on trees, and global oil resources. MacKenzie is a Professorial Lecturer in the School of Advanced International Studies of the Johns Hopkins University and a Visiting Fellow in the Woodrow Wilson National Fellowship Foundation Program.

Prior to joining WRI, Dr. MacKenzie was a Senior Staff Scientist at the Union of Concerned Scientists (UCS) from 1981 through May 1986. At UCS MacKenzie authored numerous articles and papers on various aspects of the energy issue including nuclear power safety, conservation, solar energy, and global oil resources. From 1977 to 1981 Dr. MacKenzie was Senior Staff Member for Energy at the President's Council on Environmental Quality (CEQ). At CEQ he co-authored reports on solar energy,

conservation, and the "greenhouse" problem. While at CEQ he co-chaired the Impacts Panel of the Domestic Policy Review leading to President Carter's Solar Message of 1979. Between 1970 and 1977 MacKenzie was a member of the Joint Scientific Staff of the Massachusetts and National Audubon Societies where he wrote and lectured extensively on energy issues.

Dr. MacKenzie received his Ph.D. in physics from the University of Minnesota and completed post graduate work at Los Alamos and Argonne National Laboratories and MIT before joining the Audubon Society.

Dr. MacKenzie has produced the following WRI reports:

- *Car Trouble (1993)*
- *Climate Protection and the National Interest: The Links Among Climate Change, Air Pollution, and Energy Security (1997)*
- *The Going Rate: What it Really Costs to Drive (1992)*
- *The Greenhouse Trap: What We are Doing to the Atmosphere and How We Can Slow Global Warming (1990)*
- *The Keys to the Car: Electric and Hydrogen Vehicles for the 21st Century (1994)*
- *Oil as a Finite Resource: When Is Global Production Likely to Peak?*

Jim Perkaus is a Research Fellow in the Climate, Energy, and Pollution Program at the World Resources Institute (WRI). His work centers on how to establish a robust regime of international emissions-transfer instruments to manage global climate change, including the linkages between these mechanisms and domestic regulatory policy.

In 1997, Mr. Perkaus worked on a consulting project for the Environmental Financial Products Limited L.L.C. He spent four months in 1998 as a Visiting Fellow at the International Academy of the Environment, based in Geneva, Switzerland. Since 1986 he has been a member of the MidAmerica Commodity Exchange, a Chicago Board of Trade affiliate, where until 1995 he actively traded futures, stocks, and options.

Mr. Perkaus holds an MBA from the Graduate School of Business at the University of Chicago and a MALD from Tufts University's Fletcher School of Law and Diplomacy (where he is presently a Ph.D. candidate in International Relations). He has published four articles and a book chapter.

PROPOSED RESEARCH TOPICS

Structural, Financial and Operational issues related to CDM and/or international standards for measuring and reporting business GHG emissions.

Center for Energy and the Global Environment

WHAT WE DO

The goal of the Center for Energy and the Global Environment (CEAGE) is to provide faculty members from universities worldwide the opportunity to discuss global energy and environmental issues. CEAGE is based at the Alexandria Research Institute, which has the three-pronged mission of:

- providing advanced educational opportunities for people working in high technology industries in Northern Virginia;
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- providing a forum for better international collaboration for education and research.

Research — Research activities are presently focused on global warming resulting from the use of fossil fuels for power generation and transportation. The center is looking for opportunities to reduce green house gas emissions, such as the use of solar energy to reduce the use of fossil fuels, and the use of electric vehicles to reduce both air-borne pollution and greenhouse gases. Several projects result from the center's links with state-supported funding agencies.

Education — Faculty members serve on the doctoral committees of students in different disciplines, making it possible for the students to cross academic lines as they do research and learn how to address problems related to energy and the environment. The center's location near Washington, D.C., makes it possible for international visitors to the area to be visiting lecturers, and to help develop curriculum and team teach courses offered at the center, as well as to discuss research collaborations. The center develops courses that raise students' awareness of energy and environmental issues in developing countries, and the social, financial and technical barriers that these countries face in restoring their environment.

Outreach — We offer opportunities for meaningful seminars, workshops, studies, and training activities without a heavy financial burden by holding them in target countries. We host developing country academics and policymakers to work at our center in order to assist them in formulating environmentally friendly policies for their countries.

Facilities — Our center takes advantage of existing research and teaching laboratories in member departments to study different energy and environmental issues. CEAGE also manages a 2,500-watt solar photovoltaics testing facility with three separate arrays of crystalline and amorphous modules connected to the building electrical grid through individual power conditioners. Analog meters display the system status. A fully equipped meteorological station measures wind speed and direction, cell and ambient temperatures, and plane-of-array, global, horizontal, and direct normal insolation.



The productivity of three different kinds of solar cells — crystalline, amorphous, and thin film — is measured from this solar array on the roof of Washington Hall on the Virginia Tech campus. Here, graduate student Yusef Taha collects data from the equipment that monitors energy collection and output. The solar testing facility on the East Coast is an experimental.



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The productivity of three different kinds of solar cells — crystalline, amorphous, and thin film — is measured from this solar array on the roof of Whittemore Hall on the Virginia Tech campus. Here, graduate student Yousef Yekta collects data from the equipment that monitors energy collection and output. No solar testing facility on the East Coast is as comprehensive.

Contact information

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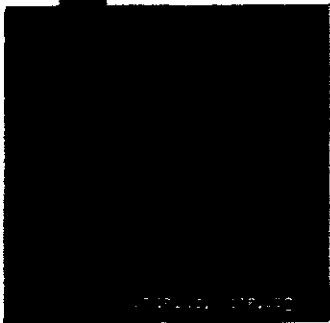
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The productivity of these different kinds of solar cells - crystalline, amorphous, and thin film - is measured from the solar array on the roof of the building that houses the testing facility. The productivity of these different kinds of solar cells - crystalline, amorphous, and thin film - is measured from the solar array on the roof of the building that houses the testing facility.



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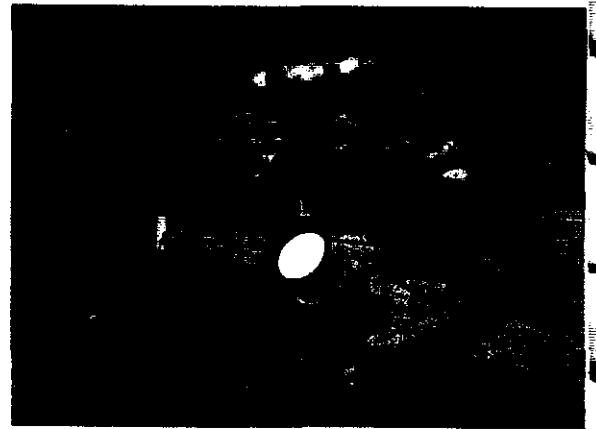
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Erik Brejla

July 28, 2000

U.S. Program Manager

USAID/India - Greenhouse Gas Pollution Prevention Project

The Louis Berger Group, Inc.

The World Resources Institute has agreed to co-host a Greenhouse Gas Pollution Prevention Project Research Forum in collaboration with the Louis Berger Group, Inc./GEP Team. The respective research topic(s) will be mutually decided based on WRI's expertise and interest. Likely topics include structural, financial and operational issues related to CDM and/or international standards for measuring and reporting business GHG emissions.

Attached is a brief information of our program staff and their expertise.

Sincerely,

Ruchi Bhandari
Ruchi Bhandari

Climate Energy and Pollution Program

World Resources Institute



THE CLIMATE OF EXPORT CREDIT AGENCIES

CRESCENCIA MAURER WITH RUCHI BHANDARI

INTRODUCTION

The environmental and social impacts of export credit and investment insurance agency (ECA) activities have received limited public scrutiny. Outside trade and finance circles little is known about ECAs—financial institutions that governments create to promote exports and facilitate investments in riskier overseas markets. During the 1990s, ECA financing through loans, project guarantees, and investment insurance averaged \$80-\$100 billion or more per annum,¹ roughly twice the levels of official development assistance during the same period (\$50 billion).² By the late 1990s, bilateral banks, made up largely of ECAs, accounted for 31 percent of all the long-term financing received by developing countries while multilateral institutions accounted for 17 percent.³

In the past decade, the economic liberalization policies adopted by many countries, and a phenomenal rise in private capital flows has dramatically accelerated global economic integration. This has been particularly pronounced for developing countries. Between 1990 and 1997, private capital flows to developing countries, virtually all of it from the world's leading industrialized economies, roughly quintupled.⁴ ECA provision of project and trade financing grew

in tandem, following much the same pattern.⁵ During the same period, governments throughout the world negotiated international environmental treaties to address the degradation of the world's environmental commons. But these conventions, including the United Nations Framework Convention on Climate Change (UNFCCC), are structured in terms of the nation state, largely ignoring the power of private finance to shape environmental outcomes in an increasingly integrated world economy. To an ever greater extent, private capital flows are responsible for building developing countries' physical infrastructure. Much of this infrastructure will shape the pattern of emissions growth in these countries, including power generation, transportation infrastructure, manufacturing plants, and development of coal, oil, and natural gas resources.

In the same way that international environmental agreements ignore private capital flows, commitments made by governments to address the environmental impacts of ECA financing do not address threats to global commons, including climate change. In June 1999, the world's seven leading industrial economies (Canada, France, Germany, Italy, Japan, the United Kingdom, and

the United States) plus Russia (the G8)* met at a summit in Cologne, Germany, and agreed to work toward a set of common environmental guidelines among their ECAs. The G8 communiqué from the Cologne Summit also emphasized the problem of climate change and the importance of helping developing countries address its challenges. Efforts to move these commitments forward, however, have not connected these two priorities. As a result, negotiations of common ECA environmental guidelines have not included climate change concerns.

The failure to place ECAs within a wider development and environmental context is generating a *policy perversity*. Governments pursue one set of objectives through climate negotiations, while their finance and trade arms ignore the global environmental implications of their activities. Although industrialized countries emphasize the importance of addressing carbon emissions in developing countries, evidence presented below indicates that ECA financing to developing countries favors exports and investments that disproportionately benefit energy- and carbon-intensive industries.

The following analysis examines ECAs in more detail—in particular, the climate

* These seven industrialized economies are referred to as the G7. In negotiations and discussions between foreign affairs ministries and heads of state, the group has expanded to include Russia and is referred to as the G8.



implications of their financing activities. The analysis discusses why ECAs have remained outside of public debates and how this contributes to the contradictions outlined above. Particular attention is given to the fact that most ECAs operate with little or no transparency, and, as a result, are rarely accountable for the environmental consequences of their financing. The analysis suggests a reform agenda for ECAs, and actions that might help to align trade and investment policies with climate commitments.

THE NUTS AND BOLTS OF ECA FINANCING

ECAs exert a powerful leveraging effect because they draw in additional private financing for exports and overseas investments. ECAs generate leverage because they spread or reduce risk through such instruments as trade finance, project finance, guarantees, and insurance.⁵ (See Box 1.) The last three instruments have grown in importance during the past decade.

Project financing attracts private investors because it is based on the merits of the project rather than the credit worthiness of the investors themselves. It is non-recourse in nature, meaning that a project's sponsors have no legal requirement to ensure repayment if project cash flows prove insufficient to cover the debt.⁷ Through guarantees or insurance ECAs assume partial or full liability for a project's failure or a borrower's default, providing a safety net to exporters and private investors.

ECAs take different institutional forms (export-import banks, state-owned companies, and even private banks that manage and disburse government funds), but most specialize in a particular subset of finan-

Fossil-fueled power generation and oil and gas development alone accounted for nearly 40 percent of project and trade finance flows to developing countries from 1994 to the first quarter of 1999.

cial services. ECAs generally fall into two categories: those that concentrate on export credits, project finance, and guarantees (export-import banks) and those that underwrite investments against losses (investment insurers).

In the last decade, the role of ECAs in reducing risk has become more important. The worldwide growth in private capital flows, particularly foreign direct investment, has increased the demand for ECAs' project financing, risk guarantees, and insurance. Roughly half of new ECA commitments in recent years has been for project financing of large infrastructure, power generation, and telecommunication projects.⁸ Similarly, the volume of investments underwritten by ECAs that belong to the International Union of Credit and Investment Insurers, known as the Berne Union, climbed from \$17 billion in 1990 to \$43 billion at the end of 1996.⁹ During the same period, the traditional financing provided by ECAs—short-term export credits with maturities under a year—diminished as ECAs increasingly privatized or delegated this form of lending to private commercial banks.

Project financing has grown in tandem with increases in international private capital flows.¹⁰ Over half of new commercial bank lending in the mid-1990s was for project financing of infrastructure, roughly \$22 billion per annum.¹¹ Other statistics indicate that project fi-

nance increased from \$10 billion in 1990 to \$80 billion in 1995.¹² Although project finance has grown dramatically, official statistics of capital flows do not separate out this category, and do not provide any disaggregated information on ECA finance. The analysis that follows relies on information from a commercial database, *Project*

FinanceWare. (See Box 2.) The data reflects the growing importance of project relative to trade finance, with the former representing almost three-quarters (74 percent) of all the flows that this database captures.

ECA FINANCING AND CLIMATE CHANGE IN DEVELOPING COUNTRIES

Overall, flows of trade and project finance going to developing countries is concentrated in sectors with important implications for future greenhouse gas (GHG) emissions. From 1994 through the first quarter of 1999, three-fifths of project and trade finance going to developing countries (\$216.6 billion out of \$376 billion) supported exports or investments that are energy-intensive: fossil-fuel power plants, oil and gas development (exploration, extraction, refining, and distribution), energy-intensive manufacturing (chemicals, iron and steel, pulp and paper),¹³ transportation infrastructure, and aircraft.¹⁴ Fossil-fueled power generation, and oil and gas development alone accounted for nearly 40 percent of project and trade finance flows to developing countries. The remaining energy-intensive sectors (transportation infrastructure, energy-intensive manufacturing, and aircraft) accounted for another 20 percent of all the financing destined for developing countries.¹⁵

Flows going to fossil-fueled power generation along with upstream and down-



ECAs are bilateral organizations that provide financial services to support the overseas trade and investment activities of private domestic companies. Their business is directed at companies from their home countries trying to enter or compete in emerging market economies or economies in transition (newly independent states). Unlike commercial banks that seek a market return on their loans or insurance, ECAs only seek to recover their operating and financing costs, providing an implicit subsidy to their clients. The financial instruments employed by ECAs are described below.

Trade Finance. This type of finance consists of loans with shorter maturities (less than 2 years) that finance the export or import of equipment or services. ECAs generally divide their trade financing into two categories *export credits* and *import credits*. In the case of export credits, short-term loans are provided directly to exporters or to intermediary banks that, in turn, loan to exporters. Import credits are similar, but they are directed at foreign buyers of goods and services originating from the ECA's home country. Lending to foreign buyers is usually done indirectly with ECAs establishing credit facilities or agreements with banks in developing countries that in turn provide the loans to foreign buyers.

Project finance. ECAs provide longer-term loans (maturities of 5 to 10 years) to overseas projects (building a

power plant or manufacturing facility, for example) when companies from their own countries are substantially involved. Project finance is usually non-recourse in nature, meaning that the loan is to be repaid from the revenues the project generates; if the project fails, the only recourse available to the lender is the value of the project's assets. In effect, the lender cannot go after the assets of its creditors.

Guarantees. ECAs grant guarantees to cover investor losses caused by civil unrest, expropriation of property, nationalization (these are classified as political risk guarantees), the inability to convert local currency into hard currency (currency transfer risks), or from breach of contract by a host country government (partial risk guarantees). ECAs also back loans against default (loan guarantees), making it attractive for commercial banks to lend money to private exporters or investors. Sovereign governments back guarantees. When a private client's losses are covered by a guarantee, the government of the ECA that issued the guarantee assumes the liability. In some cases, ECAs are able to recover losses from the government where the project or borrower is located (usually a developing country). A developing country government assumes the loss as part of its official debt with the country that issued the guarantee. In effect, the liability passes from the private to the public domain, and in some cases from an industrialized coun-

try to a developing country's official debts.

Insurance. This instrument is similar to a guarantee, but tends to be narrower in scope with regard to the losses covered. Insurance is sold to private clients at premium prices that reflect the risks associated with the country, project, or specific risk being covered. The higher the risk, the higher the premium. Governments replenish reserves with public funds on regular intervals or when insurance claims require it, but ECAs generally help build their own reserves and cover operating costs from insurance sales.

Equity Funds. A limited number of ECAs are creating equity funds that invest directly in development, infrastructure, or other commercial projects in developing countries. Private investors that contribute their own money to such funds are sometimes guaranteed minimum returns. Equity funds help ECAs spread risks across a number of projects and make it possible to invest in smaller projects. When guaranteed returns are provided, they also attract additional private money.

Sources: Michelle Chan, *The Anatomy of a Deal: A Handbook on International Project Finance*, (Washington, D.C.: Friends of the Earth-US, 1996); and Genaro G. Fullano, *Introduction to Transactional Project Finance* (Washington, D.C.: Nixon, Hargrave, Devans & Doyle, LLP, 1997).

stream oil and gas development are facilitating the extraction of fossil fuels and the power base that will consume them over the next 30 to 50 years. This is the same period during which developing countries' annual and total contributions to industrial emissions will achieve parity with that of industrialized countries.¹⁶ Although these investments are likely upgrading infrastructure, introducing more energy-efficient technologies, and

permitting fuel-switching from coal to less carbon-intensive natural gas, it is unclear whether such upgrades can transform the fixed capital that drives the carbon-intensity of many economies.

Historically, increases in GHG emissions closely track economic expansion.¹⁷ Developed countries have mature economies experiencing lower rates of growth, most of which is concentrated in ser-

vice sectors. Stable or falling population sizes are also dampening growth in energy consumption. By contrast, developing countries have rapidly growing populations and expanding industrial sectors. How much these countries increase energy consumption and emissions will depend on these economies' energy mix, economic structure, and the efficiency of their fixed capital. These factors drive energy consumption; moreover, private



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Private banks and other financial institutions use *Project FinanceWare*, a commercial database available from *Capital Data Limited* (London, United Kingdom) to track the status of project finance transactions. *Capital Data Limited* obtains its information directly from commercial banks, investment houses, and multilateral development banks. These institutions report on the financial transactions in which they play a banking role and include information on whether or not there is ECA involvement. Consequently, the data on ECAs is indirect.

Project FinanceWare provides details on discrete tranches of capital that are assembled for individual trade and project finance deals. The database identifies the financing roles played by participating banks, including brokers, managers, arrangers, providers, facility agents, securitizers, and guarantors. It is possible to sort projects by sector and subsector categories, country location, country finance source, and whether it is a development project that involves multilateral development banks. The database reports on ECAs in the context of their primary banking roles, i.e., whether they are providing or guaranteeing (the latter includes investment insurance) a tranche of financing.

Project FinanceWare contains time series data beginning in 1994 and is

updated quarterly. The cumulative total project and trade financing recorded in *Project FinanceWare* for the five-year time period examined in this report (1994 through the first quarter of 1999) is \$998 billion. About 38 percent of the total (\$376 billion) went to developing countries. This proportion is consistent with official statistics on the flow of foreign direct investment to developing economies. The latter figure is also roughly equivalent to 30 percent of total capital (both public and private) that entered developing countries during the same five-year time period.

The values of project or trade financing supplied by *Project FinanceWare* are not corrected for inflation or adjusted to reflect any base-year currency values. Consequently, all the figures presented in this document are also unadjusted for inflation or currency values. *Capital Data Limited*, calculates project amounts using the U.S. dollar value of the financing at the time they enter it into the database. In the case of foreign-currency denominated projects, *Capital Data Limited* converts these to U.S. dollar equivalents based on exchange rates published by the *Financial Times*.

Source: *ProjectWare Fields, Roles and Tables*. Unpublished document. May 1999. Produced by *Capital Data Limited*, United Kingdom.

capital has the greatest influence over them. For example, between 1975 and 1990, carbon emissions from manufacturing in Germany and the United Kingdom fell by 4 and 2 percent respectively, and remained almost flat in the United States and Japan¹⁸ even as this sector continued to grow. The decoupling of energy consumption from economic growth in industrialized countries resulted from switches in fuels, increases in energy efficiency, and shifts to less energy-intensive products.¹⁹ The key

question is: are ECAs spurring similar transformations in developing countries?

ECA financing, guarantees, and insurance accounted for roughly \$44.4 billion or 20 percent of all the financing supporting energy-intensive sectors and exports in developing countries from 1994 through the first quarter of 1999. The majority of this financing consisted of insurance and guarantees for capital projects (\$34 billion) with the remainder (\$10.4 billion) being loans for projects or export trade.²⁰ If the leveraging effect ECAs

exert is considered, however, their reach is even greater. The total value of the energy-intensive projects or exports for which ECAs provided some form of financing exceeded \$103 billion, demonstrating that every dollar of ECA financing draws in more than two dollars of private capital. This \$103 billion accounts for just under half of all trade and project financing going to energy-intensive sectors in developing countries.²¹

A closer look at this \$103 billion in projects and exports (see *Figure 1*) reveals extreme concentrations in fossil-fueled power, and oil and gas development. These concentrations are both sectoral and geographic. Upstream and downstream oil and gas development projects account for \$40.5 billion and fossil-fueled power \$33.3 billion; together they equal 71 percent of the above total. ECA-supported projects also favor rapidly growing emerging market economies. Over three-quarters of ECA-supported fossil-fueled energy and power project financing in East and South Asia went to just five countries: China (\$6.2 billion), Indonesia (\$5 billion), Pakistan (\$3.6 billion), the Philippines (\$3.6 billion), and India (\$3.3 billion). Likewise, over two-thirds of project financing for oil and gas development in Latin America went to four countries: Venezuela (\$9.6 billion), Mexico (\$2.5 billion), Colombia (\$2.2 billion), and Bolivia (\$2.2 billion). Not surprisingly, the most important destinations of ECA export credits and project financing for energy-intensive activities include developing countries with some of the largest GHG emissions. (See *Figure 2*)

Rather than decelerating developing countries' dependence on fossil fuels, ECAs appear to be investing heavily in their long-term consumption and ultimately the associated greenhouse gas emissions. A recent report by the Insti-

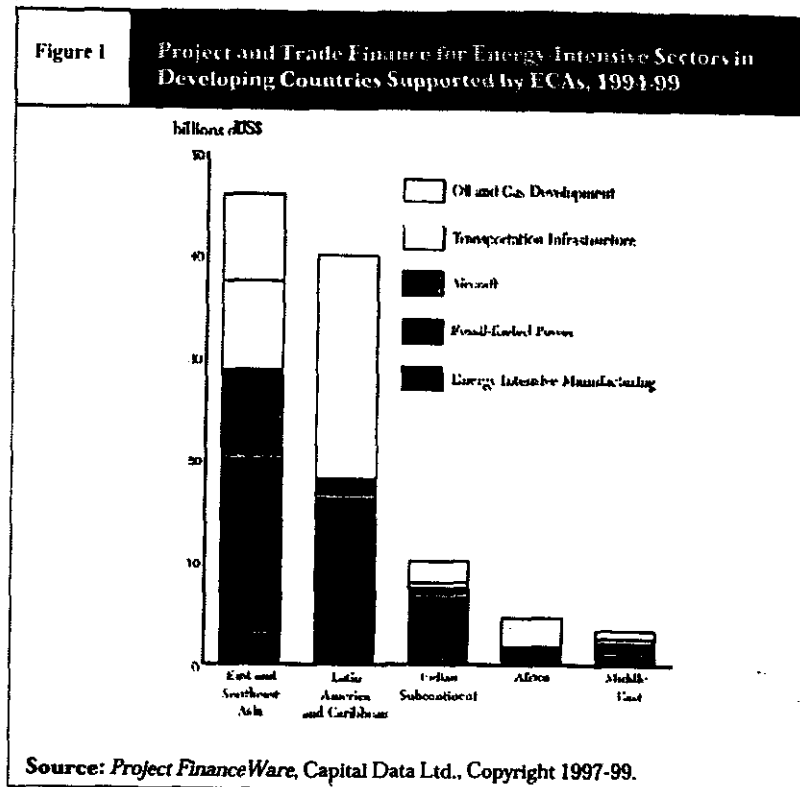


tute for Policy Studies, Friends of the Earth-US, and the International Trade Information Service looked at thermal power, and oil and gas projects in developing countries that received support from the Export-Import Bank of the United States (Ex-Im Bank) and the Overseas Private Investment Corporation (OPIC) between 1992 and 1998. The authors estimated that these projects will release 29.3 billion tons of carbon dioxide (CO₂) over their lifetimes, an amount roughly equal to global CO₂ emissions in 1996.²²

ECAs AND POLICY PERVERSITY

Public funds or institutions that support private activities should generate wider social and economic benefits such as increased domestic employment, development of new markets, equitable economic growth, and pollution abatement. Most ECAs claim that they generate these benefits, and justify their financing and banking services to private clients on this basis. From a climate perspective, however, ECAs appear to be doing more harm than good. ECA financing to energy-intensive sectors is even more concentrated in oil and gas development (39 percent) than total trade and project financing flows (29 percent) to these sectors.²³ Furthermore, such lopsided investments are not balanced by financing for cogeneration, renewable energy, or energy efficiency technologies in any significant volumes (ECAs supported about \$2 billion in financing for hydroelectric and geothermal power projects).²⁴

Data gleaned from *Project FinanceWare* indicates that ECAs directly undercut the climate commitments and concerns of their own governments. This is particularly true of the governments from the G7 countries. In June 1999 at the annual summit meet-



ing of the G8, these countries agreed to work toward a set of common environmental guidelines by 2001.²⁵ They greatly emphasized the problem of climate change, giving equal importance to making progress domestically and increasing the participation of developing countries in limiting greenhouse gas emissions. The communiqué specifically states: "We welcome the action already taken by developing countries and stress the need to support their efforts through financial mechanisms, the development and transfer of technology, and capacity building."²⁶

The January 2000 meeting of World Economic Forum in Davos, Switzerland, which brought together government, business, and civil society leaders from around the world, also stressed the urgency of addressing climate change. Leaders at the Forum voted climate

change the biggest challenge of the new millennium. Yet, most of the wide-ranging discussions on economic globalization did not examine how international finance might assist or limit global efforts to meet this challenge.²⁷

Of greatest concern, however, are the contradictions between ECA financing and the commitments under the UNFCCC. Under this Convention (primarily Articles 4.5, 4.8, and 4.9), industrialized countries agreed to facilitate the transfer of environmental technologies to developing countries and develop the financial mechanisms necessary for such transfers.²⁸ The principal financial mechanism functioning to date is the Global Environment Facility (GEF), which provides complementary funding that helps developing countries to assess climate change risks and remove barriers



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lowed by COFACE (France), Hermes (Germany), the Export Credits and Guarantees Department (ECGD) of the United Kingdom, and JEXIM.

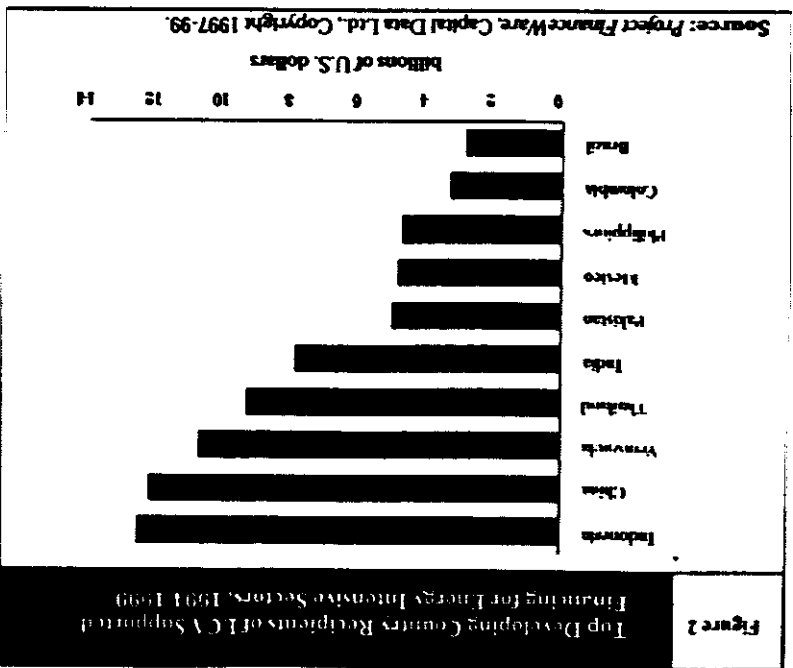
The ultimate irony is that in the ongoing negotiation of the Kyoto Protocol, a number of these countries are pushing for developing countries to take on voluntary commitments to reduce CHG emissions. In the United States, the Congress is conditioning its ratification of the Kyoto Protocol on commitments by developing countries to emission reduction targets. Industrialized countries are asking developing countries for one thing (action to address emissions increases) while their ECAs do quite another in these countries (facilitate energy-intensive development). Unfortunately, actions speak louder than words.

Developing country governments and civil society groups will have different perspectives on the implications of this wave of ECA-supported investments from the north. Some developing country delegations and negotiators under the UNFCCC may emphasize the importance of aligning these flows with industrialized countries' commitments to support technology transfer and leapfrogging in developing countries. Civil society groups in developing countries are likely to stress the importance of reducing the contradiction between these flows and a number of international commitments made by governments since the 1992 Earth Summit in Rio de Janeiro, Brazil. But policymakers in other arenas, particularly trade and economic planning ministries, are likely to perceive any initiative to redirect ECA financing as limiting their own latitude for policy and decisionmaking.

through market or private transactions. In effect, the failure to align ECAs with climate objectives represents a lost opportunity to influence technology transfer, a major objective of the UNFCCC and its signatories.

The G7 countries account for the largest volumes of ECA financing for energy-intensive exports and projects in developing countries. Figures 3 and 4 rank ECAs on the basis of the largest cumulative flows of financing to energy intensive sectors from 1994 to 1999. The leading ECAs in order of importance are the Japan Export Import Bank (JEXIM), Germany's Kreditanstalt für Wiederaufbau (KfW), the two U.S. export credit agencies, Ex-Im Bank and OPIC, and Canada's Export Development Corporation (EDC). In terms of guarantees and insurance, the biggest players in the field are Ex-Im Bank fol-

ers to renewable energy and energy efficiency technologies. Between June 1991 and June 1998, the GEF approved \$1.9 billion in total financing.²⁸ If additional government and implementing agency funds (estimated at a third of GEF financing) as well as private sector financing (an estimated \$1.2 billion at the end of 1997) are factored in, the GEF mobilized roughly \$3.8 billion for all global environmental problems in this seven-year period.²⁹ About 40 percent of this went to climate change projects, but even these figures reflect commitments rather than disbursements (the GEF disbursements to commitment ratio was close to 50 percent as of June 1998).³⁰ Thus, GEF funds, together with the additional financing they have leveraged, represent only a small fraction of the resources ECAs mobilize. The reason for this disparity is that most technology transfer and technical change occurs



²⁸ In August 1999, the Export Import Bank of Japan merged with Japan's Overseas Economic Cooperation Fund to form the Japan Bank for International Cooperation (JBIC). The data contained in these figures relate only to JEDIM lending and financing before this merger.

Figure 3

Leading ECA Suppliers of Direct Financing for Energy-Intensive Projects and Exports in Developing Countries, 1991-99

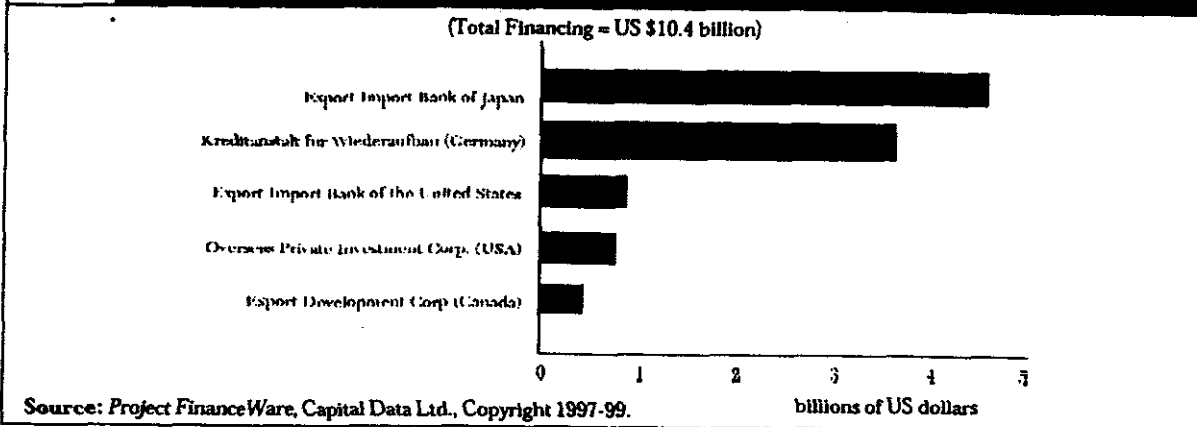
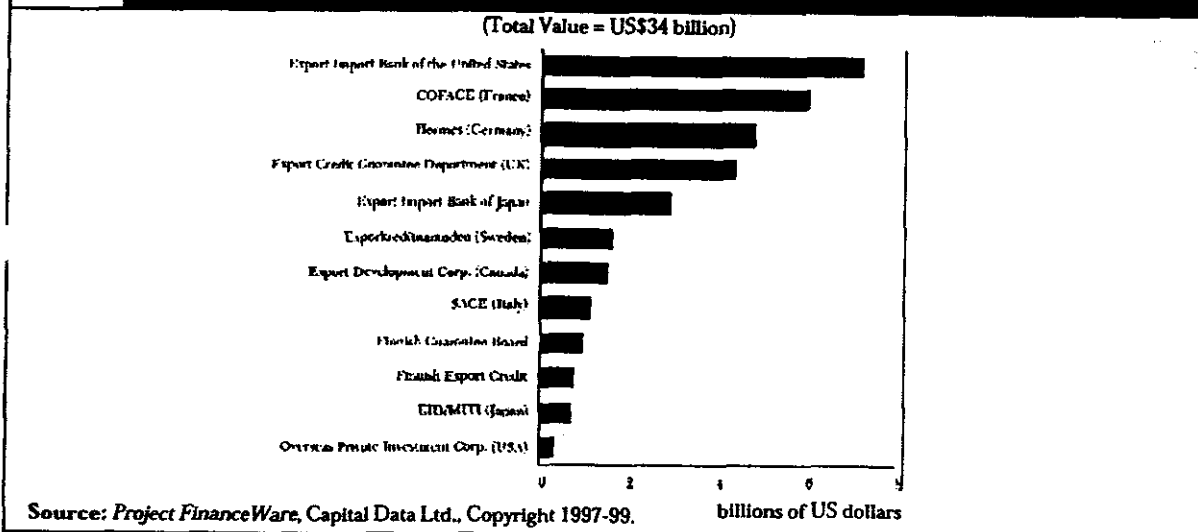


Figure 4

Leading ECA Guarantors and Insurers of Energy-Intensive Projects and Exports in Developing Countries, 1991-99



THE ROOTS OF POLICY PERVERSITY

The policy perversity discussed above does not result from governments deliberately undermining climate commitments. The roots of this perversity lie in a number of institutional problems related to how trade and investment policies are set and how ECAs operate. These problems are discussed below.

No Policy Coherence: The first problem is the lack of coherence among dif-

ferent policy arenas at national and international levels. In most industrialized countries, trade and finance policies are set apart from environmental and development assistance policies. The result is that trade and finance ministries, including the majority of ECAs that play within their arenas, argue that addressing environmental, human rights or equitable development concerns are outside their defined competencies.³² But this argument ignores the process of reform that

bilateral aid agencies and multilateral development banks have undergone. In the last 10 years, the latter group of institutions, in which OECD governments are major shareholders, recognized the need to address social and environmental impacts in their development financing. Most of these institutions (including the World Bank Group and the OECD's Development Assistance Committee) have since adopted environmental standards and practices.



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Most of the OECD governments that supported the above reforms, however, did not include their trade and export agencies in a similar process. The magnitude of this omission is becoming evident given the growing role of foreign trade and investment in developing country economies. Not surprisingly, multilateral initiatives to expand common trade and investment regimes are foundering on the rocks of environmental and social opposition. The recent OECD failure to negotiate a Multilateral Agreement on Investments (MAI) and public protests at the meeting of the World Trade Organization (WTO) in Seattle are cases in point.

The globalization of the world economy and the growing role of bank financing, underscore the need for greater policy coherence between trade, investment, and development. In the last ten years, commercial investment banks have entered the dozen or so emerging markets where most ECAs concentrate their lending. As a result, ECAs are now using their leveraging power to benefit industries or markets with growing access to commercial financing and insurance: aircraft, oil and gas, and telecommunications, among others. This begs the question: Are ECAs fulfilling their original purpose of supporting markets and projects that commercial banks are reluctant to finance or underwrite on their own?

No Transparency in ECA Decision-making. The second fundamental problem that contributes to the contradiction between climate policies and commitments and ECA investments is the lack of transparency that characterizes most ECA financing decisions. A review of the environmental information that the leading ECAs of the OECD countries make available and whether they engage exter-

nal stakeholders (see Table 1) explains why policymakers and civil society groups have not taken note of ECAs. As of February 2000, only four out of twelve leading OECD ECAs made details of their environmental guidelines publicly available. Only two ECAs routinely shared environmental information with outside parties, solicited public comment on their environmental assessments, and reported some CO₂ emissions.

ECAs generally argue against greater transparency, citing the need to protect their clients' business confidentiality. But two analyses of information disclosure policies in the banking and power sectors indicate that transparency contributes to better decisionmaking and does not significantly affect a company's or bank's private interests.

The Institute of International Finance (IIF), a global association of financial institutions with more than 300 members from 50 countries, convened a working group on transparency in emerging market finance. This group examined the need for timely, reliable statistics on capital flows, external debt, and international reserves. It highlighted the need for published financial audits and information to permit more accurate assessments of market risks in emerging markets.³³

Another report assessing the U.S. Energy Information Agency's proposed confidentiality policy in the context of reporting requirements for utilities, emphasized the importance of adequate environmental information to support informed consumer choices, assess the performance of private and public policies, and encourage market competition in deregulated energy markets. This report points out that in most cases, information disclosure requirements can be

designed to minimize any potential competitive harm to individual firms, and that disclosure of power plant performance usually has little competitive value.³⁴

No Credible Environmental Guidelines that Assess Climate Change Impacts: Closely intertwined with the problem of limited transparency is the failure of ECAs to adopt a credible set of common environmental guidelines. When the G8 countries' heads of states called for common ECA environmental guidelines, they set a deadline for developing them by 2001 and decided to work within the OECD Working Party on Export Credits and Credit Guarantees (ECG) to meet this commitment. Furthermore, at the 1999 OECD Council Meeting at the ministerial level, all OECD countries asked the ECG to work toward common environmental approaches among their ECAs. To date the ECG (which excludes ECAs that market investment insurance) has limited the access of outside stakeholders to its decisionmaking process, setting conditions on the environmental advocacy groups they will engage and agreeing only to informal meetings.³⁵ At a late February 2000 meeting on environmental matters, the ECG agreed that each country would continue to develop its own methods for assessing environmental impacts, refine a previous agreement to share environmental information between ECG members that co-finance a project, and consider how to synthesize best practices related to environmental reviews and assessments.³⁶ There are few ways to monitor whether and how the ECG and its members are advancing these agreements, and no formal mechanism for outside stakeholders to contribute to this decision-making process. Even farther behind the ECG is the association representing ECAs that market investment insurance: the Berne



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Table 1

Environmental Information Disclosure by Leading ECAs and The World Bank Group
(February 2000)

	PUBLISH ENVIRONMENTAL GUIDELINES	DISCLOSE SCREENING CRITERIA	PUBLISH ENV. ASSESSMENT RULES	RELEASE PROJECT ENV. ASSESSMENT	SOLICIT PUBLIC COMMENTS	DISCLOSE PROJECTS APPROVED	REPORT SOME CO ₂ EMISSIONS
COFACE (France)							
ECGD (UK)							
EDC (Canada)							
EFIC (Australia)							
EIDIMITI (Japan)							
EKN (Sweden)							
Ex-Im Bank (United States)							
Finnvera (Finland)							
Hermes (Germany)							
JBIC (Japan)							
Leonla Corp. Bank (Finland)							
KfW (Germany)							
OPIC (United States)							
SACE (Italy)							
World Bank Group							

Legend: Shaded areas reflect the positive position of ECAs on the indicated environmental criteria.

Sources: ECAs' own webpages, annual reports, and other published reports analyzing ECAs. In a number of cases, NGOs that track the environmental performance of these ECAs were also consulted. A detailed list of sources is available from WRI's Institutions and Governance Program in the form of a technical note.

Union. This group has yet to acknowledge the need for, or any intent to, developing common environmental guidelines or standards for its members.

A deficiency that plagues most ECAs' individual environmental guidelines is the absence of any criteria or rules to assess potential impacts on global commons: international waters and oceans, climate and atmospheric resources, forests, and biological diversity. The wave of financial flows entering emerging markets has important implications for the general trajectory of GHG emissions in these countries. With two lone exceptions, Ex-

Im Bank and OPIC which publicly report some project-based CO₂ emissions, no other ECA reports on the GHG emissions.^{37,38}

A number of ECAs argue that a defined set of common environmental standards is inappropriate given their organizational differences, the need to consider host country priorities, and the variations in the nature and quality of business activities they finance.³⁹ While these concerns are legitimate, the same set of challenges has not prevented ECAs from negotiating a common set of rules in other areas. The degree of harmoniza-

tion negotiated by ECAs under what is an OECD-supported but nonbinding gentleman's agreement, *Arrangement on Guidelines for Officially Supported Export Credits*, is quite impressive.⁴⁰ The agreement, which has been in place since 1978, establishes minimum parameters for export credits and project finance, mixed credits, and tied aid. It also details requirements for evaluating the quality of projects for which development aid is provided, along with specific terms for financing for ships, nuclear power plants, and civil aircraft.



MOVING FROM PERVERSITY TO COHERENCE

It is tempting to conclude that the perversity outlined above inevitably lead ECAs to do more harm than good from an environment and development perspective. Based on this pessimistic assessment, one might recommend that governments extricate themselves from the investment insurance and export credit business. But the phenomenal growth in the volume of private capital flows, as well as the dearth of positive policy instruments available to influence these flows, means that reform rather than elimination of ECAs should receive priority. Major elements of such a reform agenda are suggested below, with a particular focus on aligning ECA activities with the climate commitments of both industrialized and developing countries.

- *Institutionalize consultation and information disclosure, including reporting of greenhouse gas emissions.*

One of the chief obstacles to harmonization of ECA activities with climate and development assistance is the absence of timely and meaningful information on ECA decisionmaking and financing. Without access to such information, it is impossible for policymakers in other arenas, banking institutions, or advocacy groups to evaluate the environmental merits of ECA-supported projects or exports.

The first basic step ECAs can take toward improving their transparency is to open up the ECG process for defining common environmental approaches and guidelines. To date, this process has consisted largely of an internal debate among members of the ECG. Formal consultations with environmental and social advocates, development banks and bilateral aid institutions that have envi-

ronmental policies and guidelines in place, and environmental specialists, would help the ECG make more robust and technically sound decisions. If the process continues to be closed, the final guidelines or common approaches will have little credibility outside of the ECG. In the case of the Berne Union, a commitment to discuss common environmental standards or guidelines for ECAs that are investment insurers is a first priority.

Another step that should be considered is to include transparency and disclosure requirements in any common environmental guidelines that are ultimately adopted. This could take the form of publicly disclosing environmental assessments and screening exercises, allowing periods for public comment on pending financing decisions, requiring project environmental assessments to include consultation with governments and potentially affected populations, communicating mitigation measures adopted, and reporting basic environmental indicators for projects receiving ECA support. In this context, assessing the impacts of a project on the global commons would help to put ECA activities in perspective and promote stronger policy coherence.

A minimum action that ECAs could take to address climate change impacts would be to estimate and report on the annual and cumulative emissions associated with projects or exports receiving ECA support. It could be made manageable by requiring reporting only for projects in key sectors: oil and gas development projects; fossil-fueled power plants; transportation infrastructure or equipment; and the most energy intensive manufacturing, such as cement, iron and steel, chemicals, pulp and paper. The methodology for such project-based re-

porting is not yet in place, but it could be established by building on work already completed by the IPCC National Greenhouse Gas Inventories Programme (NGGIP). This program has looked at calculating emissions from specific sectors, including energy, transportation, and industrial processes; as well as research on performance benchmarking and baselines under the Kyoto Protocol's Clean Development Mechanism (CDM).⁶

Legitimately, ECAs along with other financial institutions are concerned that reporting project emissions will unfairly saddle them with responsibility for the climate impacts of the whole of a capital or development project.⁶ This argument ignores the fact that climate change results from the cumulative build-up of emissions produced by individual activities. Unless mechanisms are found to inform individual decisions, the threat of global climate change will never be addressed. For this reason, adequate reporting of emissions by ECAs is vital, even though it does not conform to country-based reporting under the UNFCCC.

Business groups and nongovernmental organizations are increasingly recognizing such public reporting as a tool to improve accountability and to aid management and decisionmaking. A clear example of such a shift is the Global Reporting Initiative (GRI), established in late 1997. The GRI seeks to design globally applicable guidelines for multinational corporations to measure and report on their economic, social, and environmental sustainability. The Coalition for Environmentally Responsible Economies (CERES) convenes the GRI with the active participation of nongovernmental organizations, international organizations, United Nations agencies,



consultants, accountancy organizations, and corporations. Through a multi-stakeholder process, the GRI is working to establish reporting practices that are equivalent to, and as routine as, financial reporting, and to promote a standardized reporting format with core metrics for specific sectors that are applicable to all enterprises.⁴³

Another example of the growing interest in reporting tools is the collaboration between the World Resources Institute and the World Business Council for Sustainable Development on a common corporate greenhouse gas emissions measurement and reporting protocol. This collaborative effort is developing modules for individual sectors, attempting to resolve key questions, such as who owns emissions, the relation of corporate reporting to national inventories, and how to define a reporting entity.⁴⁴

Reporting is also becoming a binding requirement on the part of governments. In June 1998, 35 member countries of the UN Economic Commission for Europe (UNECE) signed the Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters, known as the Aarhus Convention. A total of 23 countries have indicated they will ratify the convention; it will come into force when 16 countries complete ratification, probably before the end of 2000.⁴⁵ This Convention sets out requirements for governments to disclose environmental policies, environmental aspects of institutional performance, progress toward compliance with international environmental agreements, and state of the environment reports. It will also require public institutions to establish systems that ensure information reaches the public and outside stakeholders. With the exception of Canada,

Japan, and the United States, governments of the remaining countries responsible for the most significant volumes of ECA financing (Finland, France, Germany, Italy, Sweden, and the United Kingdom) will all be bound by the Aarhus Convention.⁴⁶

• Adoption of ECA environmental guidelines that conform to international best practice for environmental assessment and that evaluate potential climate impacts.

Environmental assessment has been codified and routinized in almost all OECD countries where public and private entities are required to evaluate and mitigate the potential environmental impacts of new development activities.⁴⁷ Among international and development finance institutions, the World Bank Group, the Inter-American Development Bank (IDB), and the European Bank for Reconstruction and Development (EBRD) have codified standards of good practice. A few ECAs, principally the two from the United States, have unilaterally adopted similar standards of environmental assessment practice. What these standards have in common are a set of procedural requirements to evaluate social and environmental impacts, quantitative standards for categories of exports or projects, exclusion of particular activities, and elements of public consultation and information disclosure.⁴⁸ But even the highest standards of good environmental assessment practice do not yet include assessments of problems of global commons.

A number of approaches for integrating climate change into a broader set of environmental guidelines should be considered. One option is to identify a set of project categories with important climate

change implications and then define threshold quantitative standards for GHG emissions or energy efficiency within each of these categories (the same ones identified for CO₂ reporting). This option would conform to the current best practices for environmental assessment that set environmental quality or emission standards for water and air. An alternative to this quantitative approach is to require project environmental assessments for selected categories to identify the best available technologies or best management practices for reducing or preventing GHG emissions, and to report on the economic and technical feasibility of incorporating these technologies and practices into a project. The most favorable financing terms possible within the *Agreement on Guidelines for Officially Supported Export Credits* could be offered to those projects that incorporate best available technologies or best management practices, or improve on quantitative standards. For example, under this agreement, certain technologies are granted 12-year payback periods. Similar flexibility could be granted to projects that include GHG emission reduction measures. This would help to capture low-cost reductions, and make more costly mitigation measures more attractive.

• Facilitate investments in renewable energy and other climate-friendly technologies.

ECA staff point out that there is no great demand for financing energy efficiency and renewable energy projects.⁴⁹ In general, ECAs respond to existing commercial and political demands, so projects and exports in mature industrial sectors tend to dominate. Another obstacle that renewable energy and climate-friendly technologies face is that project finance granted by ECAs is non-recourse in nature. That means that a loan or guaran-



tee for a project is given on the basis of the revenues that it will generate to permit repayment. Renewable energy projects are often not suited to this type of financing because they are usually smaller in scale, require longer payback periods to recoup investments, and natural phenomenon (climatic conditions or availability of sufficient biomass, for example) can affect the revenues they generate.

This means that ECAs must develop other mechanisms to attract and finance these kinds of investments. Some innovative financing alternatives are already being tested (see Box 3) and could be more widely emulated by ECAs. These programs invest equity funds or establish more flexible financing terms to compensate for the smaller scale, lumpy revenue streams, and the relatively early stage of commercialization of many of these projects.

In the past, ECAs frequently combined their own financing with official aid or even commercial lending, which is called tied aid. This practice often distorted debt markets and resulted in the transfer of technologies that were not necessarily the most appropriate or the best for developing countries. The problems generated by tied aid led ECAs to negotiate an agreement—the *OECD Ex Ante Guidance on Tied Aid*—that governs how and when it can be provided. The guidance ensures that tied aid targets the least developed economies and less commercially viable projects without distorting commercial debt markets.²⁰

Under the terms of the guidance, any ECA financing or commercial credits must be combined with a minimum amount provided in the form of grants (35 percent). As a result, most governments have moved away from providing

tied aid because it means giving a third or more of any tied aid package away. Even with these restrictions, however, some renewable energy and climate technologies qualify for tied aid because they are not yet commercially viable. If such opportunities for tied aid are pursued, the grant elements should go to capacity-building or applied research that will advance the commercialization and long-term viability of the technology.

• *Dialogues between developing country governments and ECAs on investment and export priorities that are supportive of sustainable development goals.*

Developing countries have many policy instruments they can use to influence the environmental quality of investments or exports entering their economies, such as environmental regulation, technology policy, inclusion of performance requirements in public tenders, and tariff and tax laws. As already discussed, industrialized countries, in many cases through their ECAs, also influence the destination and character of investments and exports to developing countries. Capital flows respond to forces that both pull (host country conditions and policies) and push (source country conditions and policies). For this reason, more systematic dialogues between ECAs and developing country governments are necessary to explore how the investments and exports facilitated by the former can better support the sustainable development objectives of the latter. Such dialogues should be designed to produce action plans or commitments by both sides that will permit closer alignment between an industrialized country's export and job creation priorities and a developing country's development interests.

Such exchanges are particularly important in the context of the commitments

both industrialized and developing countries have made to enhance and improve technology transfer under the UNFCCC. Because technology transfer occurs largely under the auspices of private markets and transactions, ECAs, through their leveraging capacity, can help to increase the volumes of private capital and exports that generate clear climate, and other sustainable development, benefits.

One example of such a cooperative effort is Ex-Im Bank's joint initiative with the U.S. Department of Energy, the China Development Bank, and China's State Development Planning Commission. (See Box 3.) This initiative, the China Clean Energy Program, will encourage U.S. exporters to supply China with technologies that clearly support its own development priorities.

Potential collaboration could also touch on another area of concern to developing countries, adaptation to climate change—for example, investments in coastal developments designed to meet the threat of rising sea levels, or exports of irrigation technologies that work with reductions as well as fluctuations in rainfall.

• *Reassessment of ECA missions*

ECAs need to differentiate themselves from commercial and private financial houses with a growing presence in emerging markets. The best way to accomplish this is to sharpen the mission of ECAs so that they effectively support long-term national competitiveness and sustainable development objectives. Currently, ECAs provide support to mature industries with considerable penetration in emerging markets. The short-term benefits of this approach are numerous (domestic jobs, favorable trade balances, reduced ECA losses, and support for politically influential indus-



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China Clean Energy Program. The Export-Import Bank of the United States (Ex-Im Bank), the U.S. Department of Energy (DOE), the China Development Bank, and China's State Development Planning Commission have signed a Memorandum of Understanding to carry out a clean energy program in China. Under the program, the Ex-Im Bank and the DOE will encourage U.S. private industry to work with Chinese authorities to support the identification, assessment, and implementation of projects that use wind, solar, and geothermal technologies, industrial co-generation, energy efficiency building technologies, low nitrogen oxide burners, and sulphur dioxide reduction technologies.

Energy Efficiency and Emissions Reduction Fund. The European Bank for Reconstruction and Development, the Dexia Project and the Public Finance International Bank have created a private equity fund to support investments that reduce energy consumption and greenhouse gas emissions in Central and Eastern Europe. The Fund will invest across a range of sectors, including district heating, public lighting, and industry. Investors are offered the opportunity to earn emission or carbon credits as part of the investment and trading mechanisms under the Kyoto Protocol.

Renewable Energy and Energy Efficiency Fund for Emerging Markets (REEF). The International Finance Corporation (IFC) has established REEF as a commercial investment fund to mobilize new financial resources for investments in privately sponsored projects in the renewable energy and energy efficiency sectors in developing countries and economies in transition. The Fund, which has a target capitalization of \$100 million and is supported by associated debt and grant facilities, is now in operation. Projects supported by the Fund will generate global environmental benefits as a result of avoided greenhouse gas emissions. The Fund will also help catalyze further private investment by helping to introduce proven technologies and project structures in new markets, supporting new types of projects, and engaging new sources of commercial financing.

Small and Medium Enterprise Program. The Global Environment Facility (GEF) provided \$4.3 million to the IFC to administer a program designed to stimulate greater involvement of private small and medium enterprises (SME) in addressing GEF biodiversity and greenhouse gas mitigation objectives. Six experienced SME institutions

(e.g., banks, venture capital companies, and nongovernmental organizations) selected by IFC to act as intermediaries for the program have received or will receive a low interest loan from the program. The intermediaries in turn will provide debt or equity financing to SMEs for the incremental costs of GEF eligible projects. To encourage the intermediaries to participate in the program, they may retain up to 50 percent of all capital recovered from the SMEs. The intermediaries and IFC will monitor and evaluate financial and global environmental aspects of the program.

Solar Development Group (SDG). The IFC, the World Bank, the GEF, and several U.S. charitable foundations collaborated in the development of the Solar Development Group project. This project will provide finance and business advisory services with the objective of accelerating the growth of private sector businesses involved in the delivery of solar photovoltaic systems to off-grid areas of developing countries. The Solar Development Group is designed to have a substantial development impact. The objective is to increase the use of photovoltaic solar home systems—which convert sunlight into electricity—and thus bring environmentally clean electricity to rural households.

tries), but the long-term competitiveness or development benefits are less clear. To better serve the latter objectives, ECAs could narrow financing to exports or projects that

- establish or expand nascent markets and industries;
- target exports and investments to the least developed countries;
- complement development priorities of donor organizations and host country governments; or
- incorporate innovations that address threats to global commons.

If ECAs refocus their missions on the above priorities, they could develop niches that are not well served by commercial banks. A downside is that such projects involve higher risks and could affect ECAs bottom lines if claims and defaults increase. But ECAs were originally created to assume these risks in order to encourage private investors and exporters to enter riskier markets. Managing the tension between profitability and risk is not new to ECAs. Nevertheless, governments need to decide which objective takes priority: reduced losses and lower risk for ECA balance sheets and reserves or accepting near-term fi-

nanial costs to gain long-term development advantages.

FULFILLING THE G8 MANDATE

The G8 decision on ECA environmental guidelines establishes a clear mandate: harmonize ECA environmental policies and help developing countries address the challenge of climate change. Fulfillment of the first part of this mandate has been extremely limited, largely because of the relatively closed debate within the ECG, and a failure to include ECAs that are investment insurers in any development process. If this state of affairs continues, the likely result is a set



of guidelines that descend to the lowest common denominator of ECA environmental practice, and also fail to reach a significant subset of ECAs.

The political reality is that developing credible ECA guidelines and better aligning ECA objectives with climate policies will require decisionmakers at much higher levels to take an active role in determining how the G8 mandate is fulfilled. This means that finance ministries and ministers must assert the importance of defining guidelines through a transparent process and the relevance of climate and other environmental concerns. Decisionmakers in other arenas, particularly development assistance and climate, will need to push for greater coherence between ECAs and their own policy concerns. Finally, policymakers will need to agree to eliminate the ECG's current monopoly over the debate on what should constitute ECA environmental practice. A decisionmaking process that addresses the concerns, and incorporates the experience of external stakeholders, holds the greatest promise for producing technically credible and politically feasible environmental guidelines for all ECAs.

ABOUT THE AUTHORS

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NOTES

1. The World Bank, *Global Development Finance: Analysis and Summary Tables* (Washington, D.C.: The World Bank, 1998), pages 57-59.
2. *Ibid.*, page 123.
3. *Ibid.*
4. United Nations Conference on Trade and Development, *World Investment Report 1998: Trends and Determinants* (New York and Geneva: United Nations, 1998), page 13.
5. The World Bank, *Global Development Finance: Analysis and Summary Tables* (Washington, D.C.: The World Bank, 1998), pages 57-59.
6. A general explanation of export credits was obtained from the European Commission's Directorate of Trade. Their Web page explains export credits on the following site www.europa.eu.int/comm/trade/mtd. Explanations of guarantees, insurance, and project finance were drawn from Michelle Chou, *The Anatomy of a Deal: Introduction to International Project Finance* (Washington, D.C.: Friends of the Earth-US, 1996); and Genaro G. Fullano, *Introduction to Transactional Project Finance* (Washington, D.C.: Nixon, Hargrave, Devans & Doyle, LLP, 1997).
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14. Aircraft are exempted from reductions mandated in the Kyoto Protocol, but a recent analysis of their impacts on the atmosphere estimates that by 2050 they will account for between 4 to 15 percent of the global greenhouse effect. The following is the reference for this report: Intergovernmental Panel on Climate Change, *Aviation and the Global Atmosphere: Summary for Policy Makers*, a special report of Working Groups I and III. Presented at the joint session of these working groups in San José, Costa Rica, April 12-14, 1999.
15. To arrive at these figures WRI conducted a database search of *Project FinanceWare*. The search parameters were set to include all signed project and finance transactions from 1994 through the first quarter of 1999 going to developing countries (not including the transition economies of Eastern Europe or the former Soviet Union) for the sector and subsector groups indicated in the text.
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17. Kevin A. Baumert, Ruchi Bhandari, and Nancy Kete, "What Might a Developing Country Commitment Look Like?" *Climate Notes* (Washington, D.C.: World Resources Institute, May 1999).
18. Lawrence Berkeley National Laboratory, *International Network for Energy Demand Analysis: Industrial Draft analysis*. (Environmental Energy Technologies Division, November 1998).
19. *Ibid.*
20. To arrive at these figures, the *Project FinanceWare* search on trade and project finance flows to energy-intensive sectors was further refined to select for ECA participation in two banking roles: guarantor and provider. First, a longer analysis was carried out of guarantors involved in project transactions to determine the amounts of guarantees or insurance ECAs provide. In the second search, all institutions playing a "provider" role in bank transactions were selected and ECAs were then identified from this list to determine amounts of ECAs' trade and project financing.



21. To determine the leveraging effect of ECAs, a third search was carried out to calculate the total value of projects where there was some form of ECA participation.
22. Institute-for Policy Studies, Friends of the Earth-US, and the International Trade Information Service. *OPIC, Ex-Im, and Climate Change: Business as Usual?* (Washington, D.C., April 1999).
23. Oil and gas projects that receive ECA support account for \$40.5 billion (39 percent) of the total value of energy-intensive projects receiving ECA support (\$103.32 billion). By contrast, financing for oil and gas development projects (\$64.2 billion) represents 29 percent of all flows going to energy-intensive sectors (\$216.6 billion).
24. This total was determined by searching the renewable energy sector category of projects in *Project FinanceWare* for ECA participation in any bank role and as a guarantor. A number of renewable energy projects were incorrectly coded as conventional power projects within *Project FinanceWare*. These were removed from our list of projects used to estimate project financing for fossil-fueled power, and those with ECA involvement were added to the list of renewable energy projects.
25. Paragraph 32 of the G8 communiqué. The text of the communiqué is available on the Web at www.usia.gov/topical/econ/g8koIn/20commun.html.
26. Paragraph 33 of the G8 communiqué. The text of the communiqué is available on the Web at www.usia.gov/topical/econ/g8koIn/20commun.html.
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38. Estimates of OPIC power project emissions of CO₂ are available on the Web under OPIC and the Environment at www.opic.gov.
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40. The text of this agreement is available on the Web at <http://www.oecd.org/ech/docs/xcr.htm>.
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The World Resources Institute provides information, ideas, and solutions to global environmental problems. Our mission is to move human society to live in ways that protect Earth's environment for current and future generations.

Our program meets global challenges by using knowledge to catalyze public and private action:

- To reverse damage to ecosystems. We protect the capacity of ecosystems to sustain life and prosperity.
- To expand participation in environmental decisions. We collaborate with partners worldwide to increase people's access to information and influence over decisions about natural resources.
- To avert dangerous climate change. We promote public and private action to ensure a safe climate and sound world economy.
- To increase prosperity while improving the environment. We challenge the private sector to grow by improving environmental and community well-being.

CPI

The Climate Protection Initiative (CPI) works to accelerate the business community's acceptance of climate change as a real, manageable problem and to encourage constructive private sector action. As part of this effort, analytical studies are carried out to address business concerns regarding climate change, identify acceptable policy responses and business strategies, and explore avenues for positive engagement with developing countries.

IFFE

The International Financial Flows and the Environment (IFFE) Project analyzes the environmental implications of recent changes in the landscape of development finance. Project activities are designed to identify key leverage points for mainstreaming environmental considerations into the decision-making of major public and private international financial institutions.



World Resources Institute

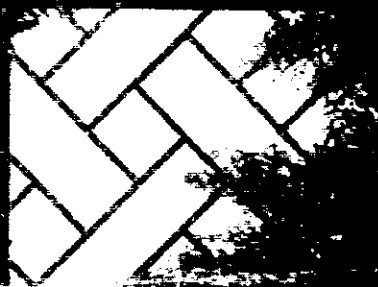
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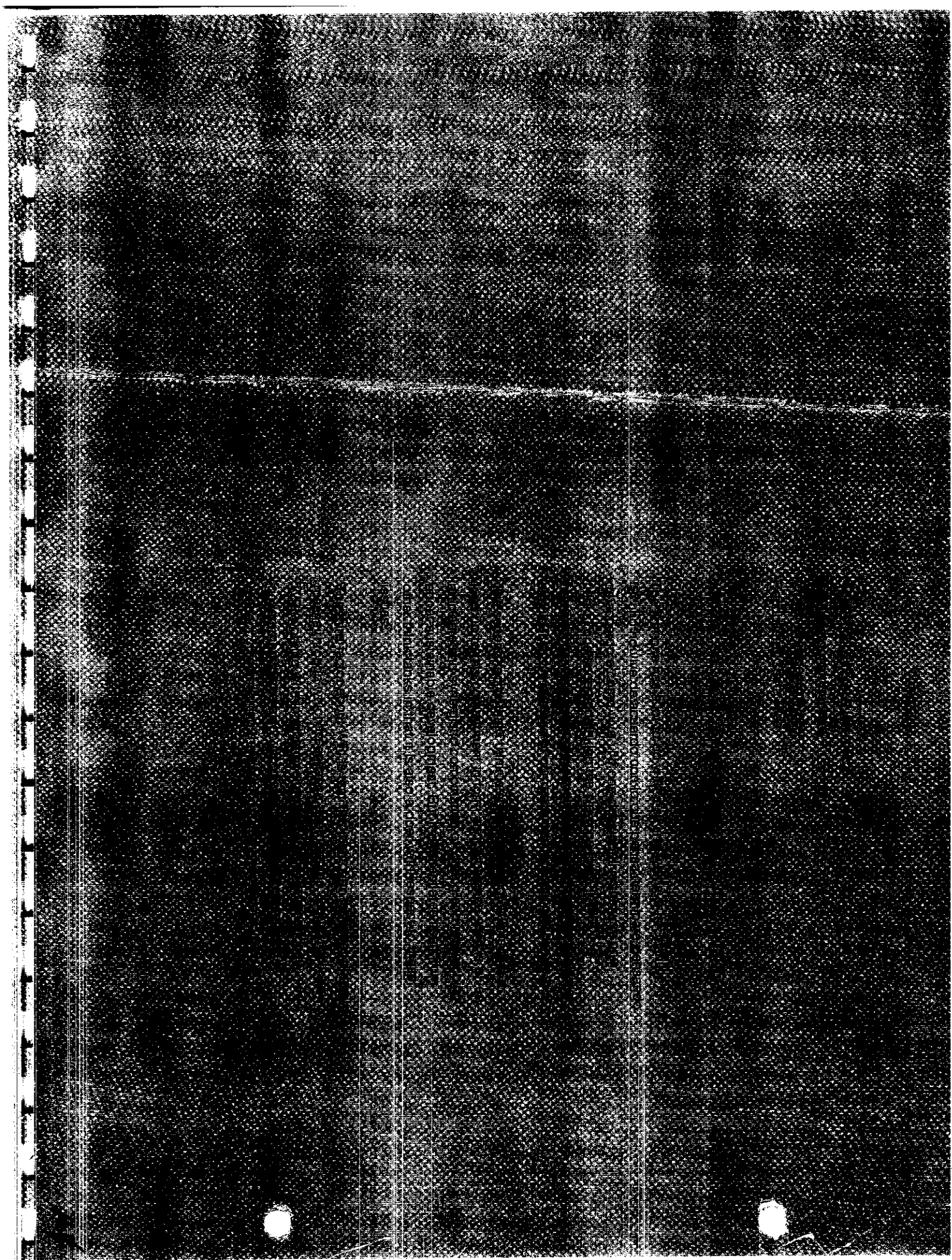
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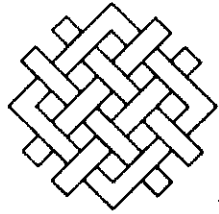


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Ideas into Action







World
Resources
Institute

Ideas into Action

WASHINGTON, D. C.

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To reverse damage to ecosystems

We protect the capacity of ecosystems to sustain life and prosperity.

To expand participation in environmental decisions

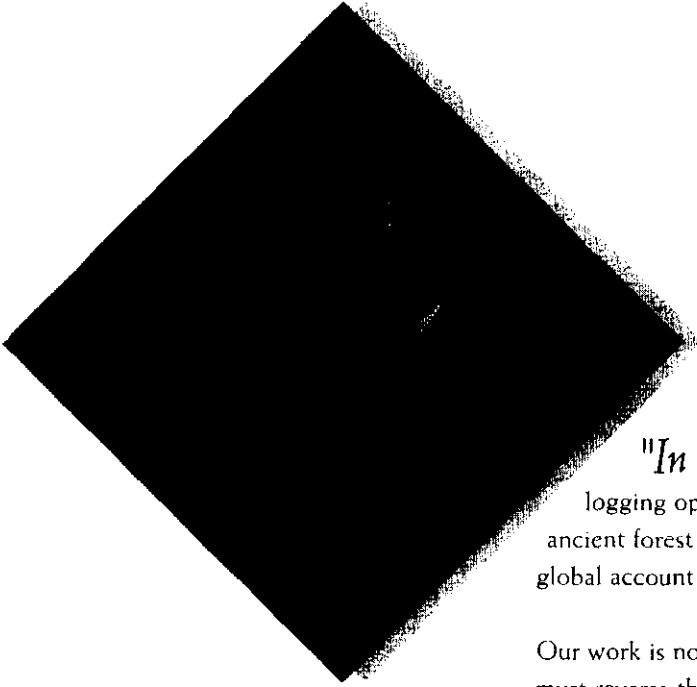
We collaborate with partners worldwide to increase people's access to information and influence over decisions about natural resources.

To avert dangerous climate change

We promote public and private action to ensure a safe climate and sound world economy.

To increase prosperity while improving the environment

We challenge the private sector to grow by improving environmental and community well-being.



From the President

WRI puts ideas into action to change the world.

"In the Summer of 1997, eighteen environmental protesters were arrested as they sought to block logging operations in the Great Bear Rainforest in British Columbia. The Great Bear, they said, was a remnant of ancient forest too precious to cut. In court, they pointed to WRI's ground-breaking study, *The Last Frontier Forests*, the first global account of the loss of original forests – 80 percent gone and disappearing rapidly — to explain their actions.

Our work is not designed to spur civil disobedience, but it is intended to catalyze action. Action is urgent in a world that must reverse the accelerating trends of biotic impoverishment, climate destabilization, and ecosystem destruction, even while it finds means to provide new opportunity to more people.

Jonathan Lash

has led the World Resources Institute as its president since 1993 and co-chaired the President's Council on Sustainable Development and the Organisation for Economic Co-operation and Development's High-Level Advisory Group on Environment.

Our tools are information, ideas, and communication. In the pages that follow we report on our work to bring ideas into action, to dispel myths with facts, and to meet problems with practical solutions: Global Forest Watch, an innovative global network to marry satellite data to the work of local activists. The Safe Climate, Sound Business collaboration in which we worked with major companies to develop measures to make preventing global climate change a good business opportunity. The Millennium Assessment project in which we are coordinating the work of a score of institutions to catalyze a first-ever global assessment of the current and future capacity of the world's ecosystems to continue to provide the environmental goods and services.

Those protesters were found to be in contempt of court. But we were astonished and fascinated when the largest of the logging companies operating in British Columbia showed up in our offices seeking advice on how to shift their practices toward sustainability. Ideas can indeed be put into action to change the world."

From the Chairman

WRI is working as well as any institution in the world to put sustainable development into practice.

"WRI has done all kinds of good worldwide on environmental issues. I was in Buenos Aires in November 1998 for the international negotiations on climate change. I could see firsthand the excellence of the WRI staff, the deep respect that representatives of foreign governments held not just for Jonathan Lash but for all the staff of WRI. I wasn't surprised that they had this level of understanding and respect, but it was really gratifying to see how many people in the world understand the excellence of this institution and the work that it does.

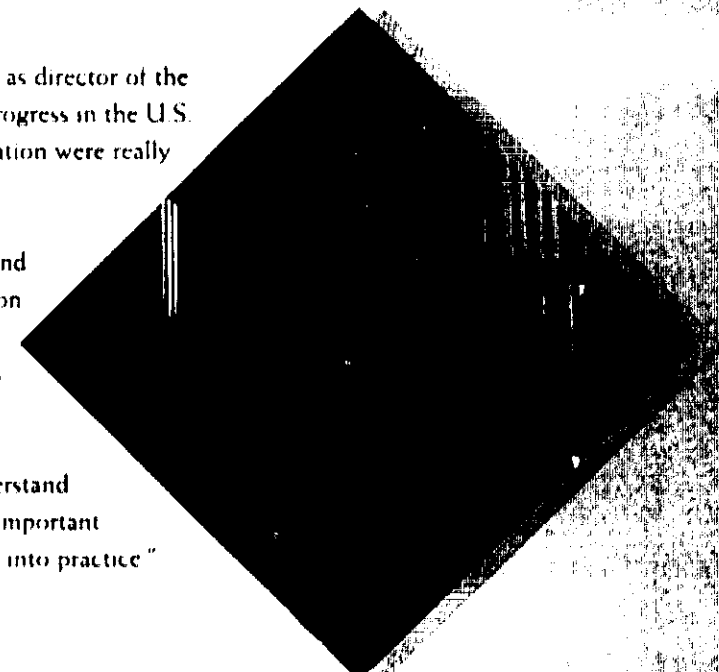
The global concern for environmental action has had a deep impact on me. As a result of my two tenures as director of the U.S. Environmental Protection Agency, I saw the global nature of environmental problems. If we made progress in the U.S. but did not mirror that progress across the world, the chances of reversing global environmental deterioration were really quite slim.

As the U.S. representative to the World Commission on Environment and Development, or the Brundtland Commission, I had the opportunity to travel the world to assess the best direction for environmental action worldwide. Out of that experience came the report, *Our Common Future*, which proposed the concept of sustainable development as the way in which the world deals with the environmental and social problems created by the legitimate desire for development.

The concept of sustainable development is central to the work at WRI. Being able to help the world understand and pursue pathways of development that are consistent with protecting the environment is a broad and important assignment. I think WRI is working as well as any institution in the world to put sustainable development into practice."

*William D.
Ruckelshaus,*

**chairman of WRI's Board of
Directors since 1998,
is a principal of the
Madrona Investment Group
in Seattle, Washington.**



Record

1982

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil

1984

1985

1986

1986

1988

United Nations Office of the International Institute for Environment and Development, Nairobi, Kenya

1989

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil

1990

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil

1990

United Nations Conference on Environment and Development, Rio de Janeiro, Brazil

1991 WRI develops a statistical index of greenhouse gas emissions to help countries measure their share of pollutants.

1992 After three years of collaboration with partners worldwide, WRI launches the Global Biodiversity Strategy, which plays a major role in the development of the Convention on Biological Diversity, signed at the United Nations Conference on Environment and Development in Rio de Janeiro.

1996 WRI develops the first natural resources accounting model of the U.S. agricultural sector. Results are used by the U.S. Senate Agriculture Committee to improve environmental effects of pending farm legislation.

1996 WRI merges with the Management Institute for Environment and Business (MIEB), increasing WRI's focus on working with business to solve environmental problems.

1997 WRI combines satellite imagery, computer technology, and data to produce the first scientific assessment of the world's large, intact natural forest areas.

1997 WRI's analyses inform the U.S. delegation in negotiations on the Kyoto Protocol on Climate Change.

1998 WRI works with businesses to develop ways to combat climate change while ensuring profitability. As a result, General Motors publicly affirms its support for climate protection.

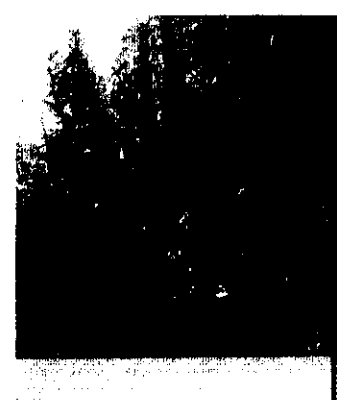
1999 WRI moves to its new office space, a model of innovative environmental design.

1999 WRI commits to reduce its own CO₂ emissions to zero by 2005.

1999 WRI develops the first indicator of carbon intensity, relating emissions to economic growth.

2000 WRI launches Global Forest Watch, the first independent network for real-time monitoring of forest frontiers around the world.

2000 World Resources 2000's pilot study of ecosystems presents the U.N. General Assembly with a model for a comprehensive Millennium Assessment.



Jonathan Lash

A team of exceptional people

A program to meet global environmental challenges

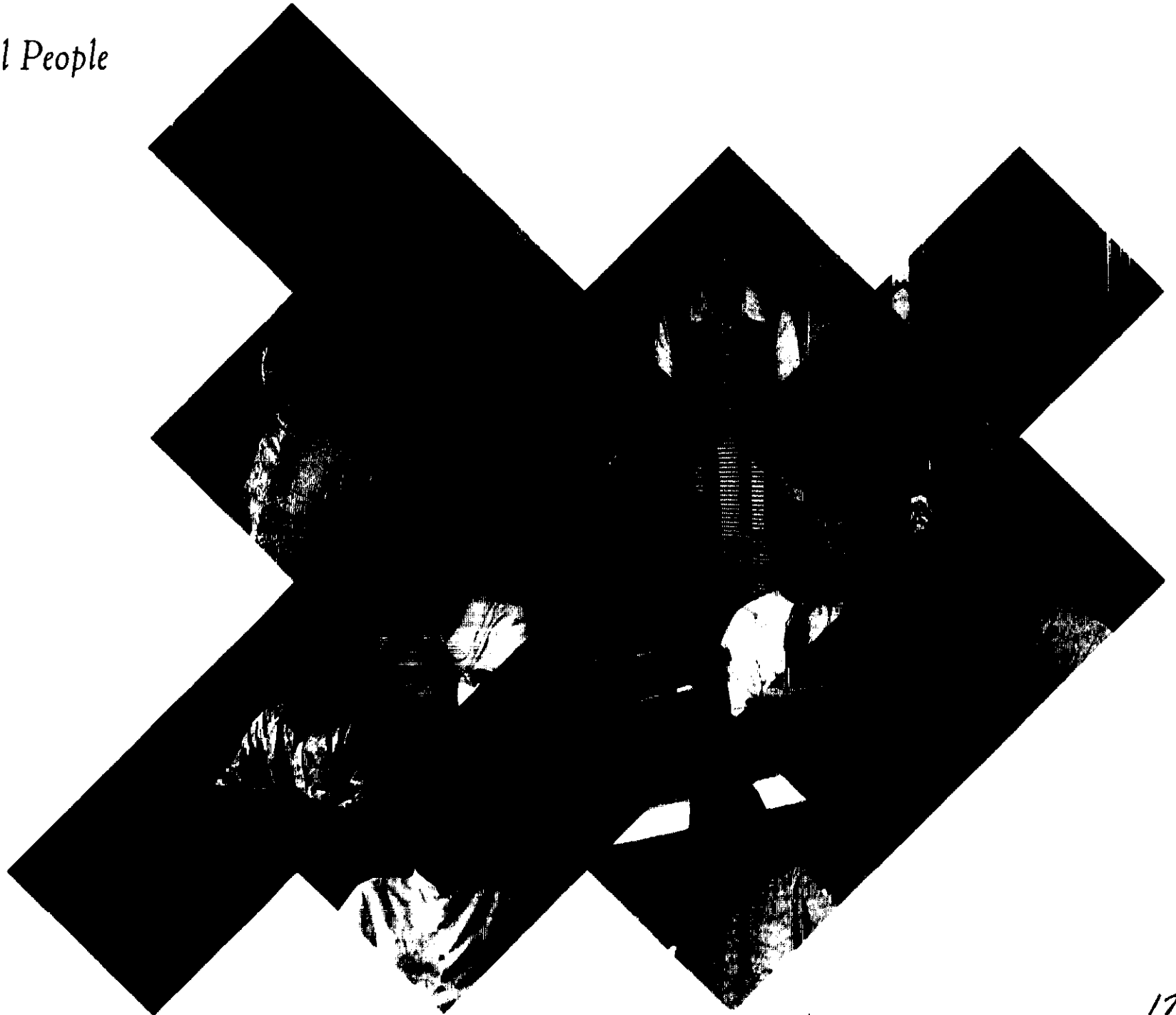
A commitment to put ideas into action

"When WRI was founded in 1982, our goal was to place questions of natural resource destruction, environmental pollution, and ecosystem degradation on the global agenda. We operated on the premise that on any particular issue there was a small group of people that could set the international agenda and drive change—a set of official policy makers and the people who influenced them. We were convinced that solid science and sound policy analysis would be essential tools for setting that agenda. We were enormously successful.

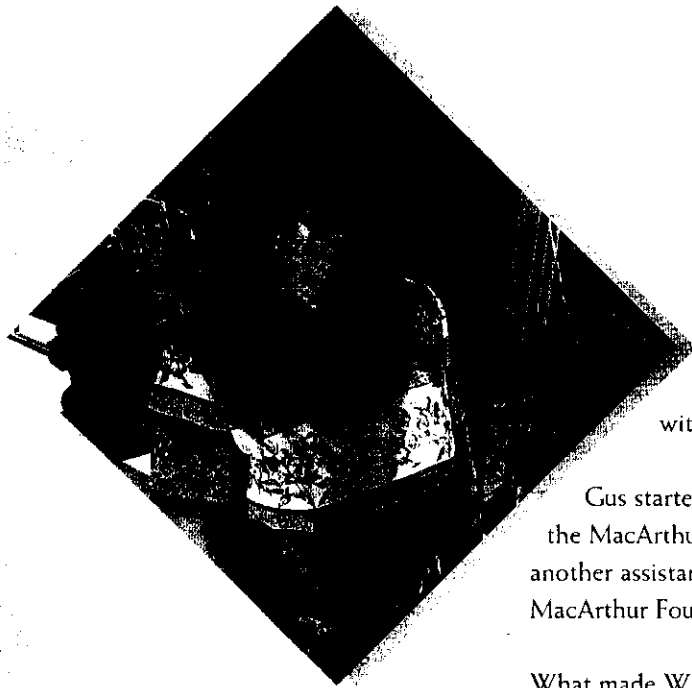
Now, as our expertise and scope of work have grown, so has our family. Today we are 125 talented professionals from more than 20 nations, connected to a dynamic network of advisors, collaborators, international fellows, and partner institutions in more than 50 countries, using new information and communication technology to influence decisions once the closed province of elites.

The range of views expressed here, from some of our founders to some of our newest staff members, demonstrates that WRI is more than the sum of its history or the aggregate of its programs. We are a body of creative, committed individuals—WRI's greatest resources."

*A Team of
Exceptional People*



WRI, from the start, has had an international focus.



*Patti Adams, one of
WRI's original employees,
has been executive assistant
to both WRI presidents.*

"I've seen a lot of change at WRI and in the environmental movement over 20 years. I began working with Gus Speth when he was a founder of the Natural Resources Defense Council and then moved with him to the Council on Environmental Quality in the U.S. government.

Gus started thinking of a place like WRI when he was at NRDC. The idea became a reality in 1982, with the help of the MacArthur Foundation. There were five of us at the beginning: Gus, Jessica Matthews, Wallace Bowman, myself, and another assistant. We started in a donated space, with three used typewriters that had come in the mail from the MacArthur Foundation, and boxes of resumes from wonderful people.

What made WRI different? It was originally conceived as a think tank for policy research. Most other NGOs then were pursuing legal actions or activism, mostly from a domestic perspective, without looking at broader policy questions. WRI, from the start, had a more international focus. One of our first conferences, *The Global Possible*, brought together people from different countries and cultures, some from our board of directors and others from governments, businesses, or international agencies. To reach an agreement, the participants were debating late into the night, and we were typing until three or four in the morning as the final recommendations were drafted. Now that kind of interaction among different cultures and different perspectives happens a lot, but then it was very unusual. One of WRI's main contributions has been to shift the environmental debate from a national to an international level by bringing people together at the table.

I feel privileged to have been here from the beginning, to watch WRI grow from 5 people to 125 and to reach out to the business and development communities. My job has remained interesting because of the growth of WRI. At the beginning, we saw our mission as establishing a credible institution, through research. Now, as WRI has established its credibility, we recognize that there needs to be more than research – there needs to be action, too."

WRI is one way to amplify the difference you can make.

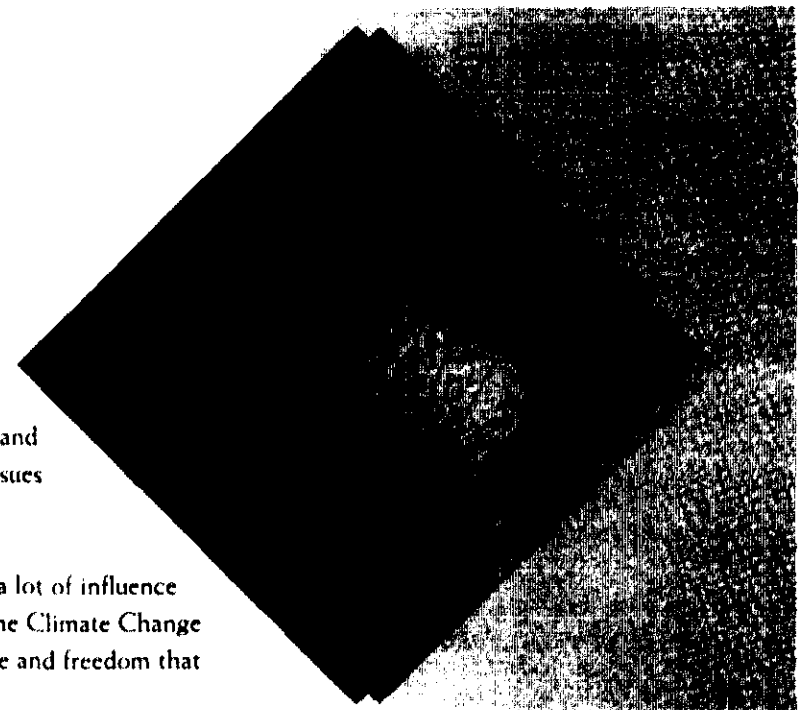
"I worked at the local level in the Philippines as a human rights lawyer, especially defending indigenous peoples' rights to territory, to access to natural resources, to cultural autonomy and political autonomy. That experience led me to work at the national level both as a policy advocate and as a policy maker. I felt, after years of dealing at national and local levels, that it was time to push the issues that I believe in at the global level.

I decided that WRI was the place to do that for two reasons. First, WRI is a credible organization with a lot of influence on policy processes at the international level, particularly for the conventions I've worked on, such as the Climate Change Convention and the Convention on Biological Diversity. Second, WRI gives me a level of independence and freedom that one does not have in government or intergovernmental institutions.

We now have a policy infrastructure to deal with many environmental problems at the international level. But it's not moving, or it's moving too slow, because you have to move 150 or 170 countries to act together. WRI can play a positive role in accelerating the process.

My experience has always been to deal with environmental issues from a human perspective. Even as a government official, I was always the one whom my boss, the Minister of Environment, would send to talk to people about why a problem was happening. When you experience environmental issues as an engagement with human beings who will be changed by the outcome, you must change the way you look at the world. It becomes a much more beautiful world, but what you need to do becomes more urgent.

The question I always ask myself is, Is this making the world a better place to live in? Am I having an impact? It's a big world, and you try to find ways to amplify the difference you can make. Joining a group like WRI is one way to amplify the difference that you can make."



Tony LaViña,

director of the Biological Resources program, is the most recent addition to WRI's senior staff. He came to WRI from the Philippines, where he served as undersecretary in the Department of Environment and Natural Resources and as negotiator in implementing the conventions on biological diversity and climate change.



*A Program to Meet Global Challenges
To Reverse Damage to Ecosystems*

Deteriorating biological resources threaten to disrupt the life-sustaining goods and services that ecosystems produce, such as water purification or erosion control. Human use of fragile ecosystems is placing an enormous strain on forest, marine, and agricultural systems all over the world.

WRI's work:

Safeguards biodiversity by shaping international debates and negotiations.

Promotes a safe, accessible, and environmentally sustainable food supply.

Protects the world's diminishing frontier forests.

Creates markets to protect clean air and water.

Protects sensitive coral reefs and ends destructive fishing practices.

WRI explores environmental issues with rigor and focus on what to do about them.

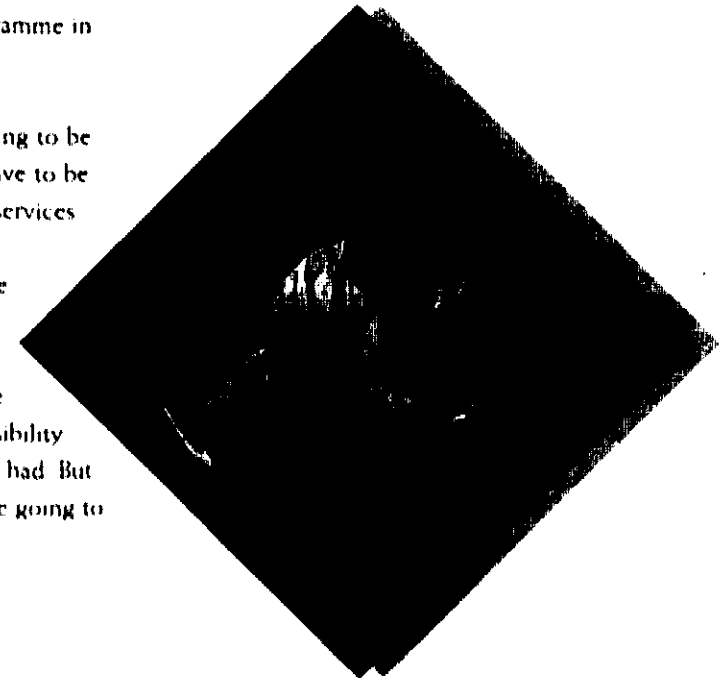
"WRI is a perfect place to explore environmental issues. And not just explore them in a dry, analytical sense, but with rigor and with a focus on what we are collectively going to do about them. I believe whatever solutions we find have to be grounded in an understanding of the way the physical world works, but that we also have to be sophisticated about the way the policy and economic world works.

Our concept for a millennium assessment of ecosystems may be that kind of solution. In effect, it's saying that the world needs a way to evaluate scientifically how well ecosystems are performing. How long can ecosystems continue to produce the goods and services that we depend on? Most important, in building a process to evaluate what we know, how can we put that knowledge in a context that policy makers can use, one that will help communities, nations, and international institutions better manage the Earth's living systems? A pilot assessment will be featured in *World Resources 2000-2001*, which WRI will publish with the World Bank, UN Development Programme, and UN Environment Programme in September 2000.

I think it's also important to begin to envision how landscapes of the future are going to look. They're going to be more fragmented than they are today. They're going to have to support more people. They're going to have to be managed differently. So WRI's Critical Flows project, focusing on water issues, is exploring how to value services from ecosystems, such as water purification and erosion control. Similarly, Kenton Miller's project on Ecosystems, Parks, and People is beginning to envision what these landscapes of the future might look like and how we might actually have to manage them.

These projects are going to tell us something interesting and useful about how we might have to manage the world that this generation—*our generation*—is going to leave to our children. We need to fulfill our responsibility for stewardship and for ensuring that our children and their children are able to enjoy the bounty that we've had. But it's going to be a different world than we have now. And we need to face up to that and figure out how we're going to make it work."

Tony Janetos, senior vice president and chief program officer, is co-chair of the U.S. National Assessment of the Potential Consequences of Climate Variability and Change. Before coming to WRI in 1998, he was a senior scientist at the National Aeronautics and Space Administration in the United States.





To Expand Participation in Environmental Decisions

Limited access to education and information, to technologies and resources, to markets and decision-making forums diminishes the well-being of people everywhere. These gaps in opportunity are an environmental tragedy, as well as a human one, because inequitable participation in economic and political systems leads to unnecessary degradations of natural resources.

WRI's work:

Supports regional cooperation on resource management in the Mekong River system and the Mesoamerican biological corridor.

Assists partners in Africa and Eastern Europe to address the governance issues that impede environmentally sustainable development.

Determines the points of leverage for environmental advocates to influence public and private decision-making on international financial flows.

WRI is sensitive to local political realities.

"My experience in Indonesia provides me with a healthy skepticism about what a Washington-based organization can do that's most helpful to partners in developing countries. It's skepticism about how much global public policy processes matter to what's happening on the ground. So I think that helps me be realistic about the kinds of ambitions that we take on at WRI.

WRI got involved in Southeast Asia out of a strongly felt sense that things were changing really fast in the region. At the same time, decisions on the basic development path were not sufficiently taking into account the role of ecosystems in supporting national economies, nor the needs of the people for sustainable livelihoods.

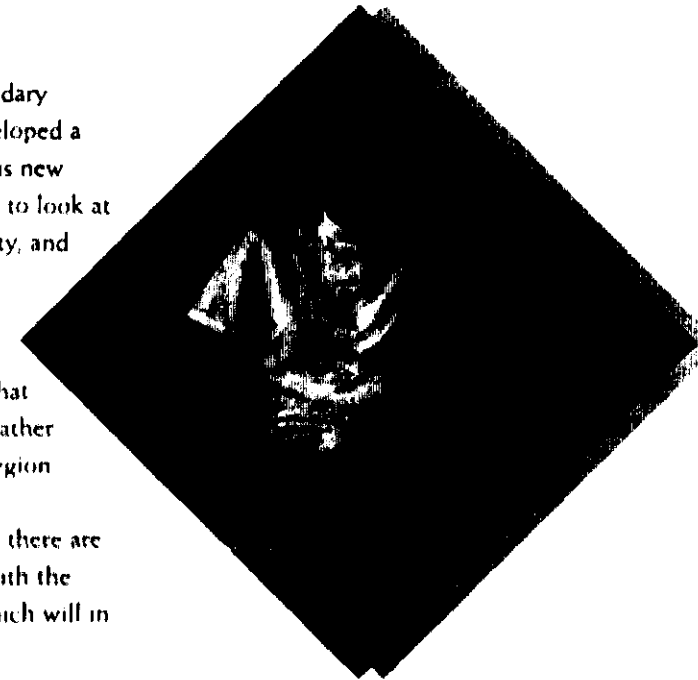
We've worked with local partners to do an environmental impact assessment of a road planned in a transboundary watershed between Vietnam and Laos. We've held a workshop on trade in timber forest products. We've developed a database on what we know about forest cover change from satellite imagery. But as we've been developing this new program on institutions and governance, we've recognized that WRI's comparative advantage in this region is to look at development problems through a governance lens. What is it about the level of authority, institutional capacity, and participation in decision making that's leading to environmentally perverse outcomes?

In considering solutions, WRI shows its sensitivity to local political realities by staffing with people who really know the region, who can work closely with partners in the region, and who can be effective in ways that don't endanger ourselves or harm our partners politically. For example, we've taken development objectives, rather than explicit environmental objectives, as our entry point in dialogue with governments and partners in the region.

Thus, our dialogue on watershed issues does not involve preaching that we should protect the forests because there are important butterflies living there. Rather, the exchange is over the value of ecosystem protection compared with the economic costs of having to deal with the downstream flooding, water shortages, and the loss of fisheries, which will in turn compromise aspirations for national development."

Frances Seymour

is director of WRI's
Institutions and Governance
Program. Before joining WRI,
she worked on development
assistance policy for the
World Wildlife Fund and on
community development
projects in Indonesia for
the Ford Foundation.



Christine Elias,
now director for international
cooperation, was team
leader for WRI's Policy
Research Capacity Initiative.

WRI has partnerships with institutions around the world.

"Through years of work at the grassroots level in The Gambia in West Africa, I saw first-hand how local conditions are very directly influenced by global trends and international actions. So, what drives me in my work at WRI is the need to provide analyses of global issues that contribute to the development, security, and livelihood of people on the ground.

WRI is actively engaged in the processes of the Convention on Biological Diversity, a global forum in which nations are deciding the future of ecosystems. The implementation of this critical convention is currently hindered because many countries don't have the policy research capacity they need to find actions that balance their national priorities against the global goals of the convention. I had the privilege of working on a partnership with three institutions around the world — the African Centre for Technology Studies in Nairobi; the Peruvian Society for Environmental Law in Lima; and the Regional Environmental Center in Budapest — to build an international constituency that would help strengthen national policy research capacity to implement the convention. We worked from the ground up, each of us in our respective regions, to draw people together on the issues. Then we shared our results across the regions to build global support, all the way until we reached the convention's global Conference of Parties. As a result, fourteen decisions were taken in support of improving capacity building for policy research and policy analysis. Those decisions were made by representatives from the 165 countries that are signatories to the convention. Each of the partner institutions has established its credibility and access to policy makers in their home region. Working together, we showed how our collective action produced results that were far greater than we could have achieved working alone."

John Mugabe

is director of the African
Centre for Technology Studies.

"There is no way that countries can implement the Convention on Biological Diversity without the capacity to analyze tradeoffs between various policy alternatives. This is one of the most formidable challenges for countries, especially in the developing world. Our work with WRI and our other partners was just the beginning of a long and complex process in implementing the convention. We must continue to invest in such processes and partnerships."

WRI is helping developing countries pursue a sustainable future.

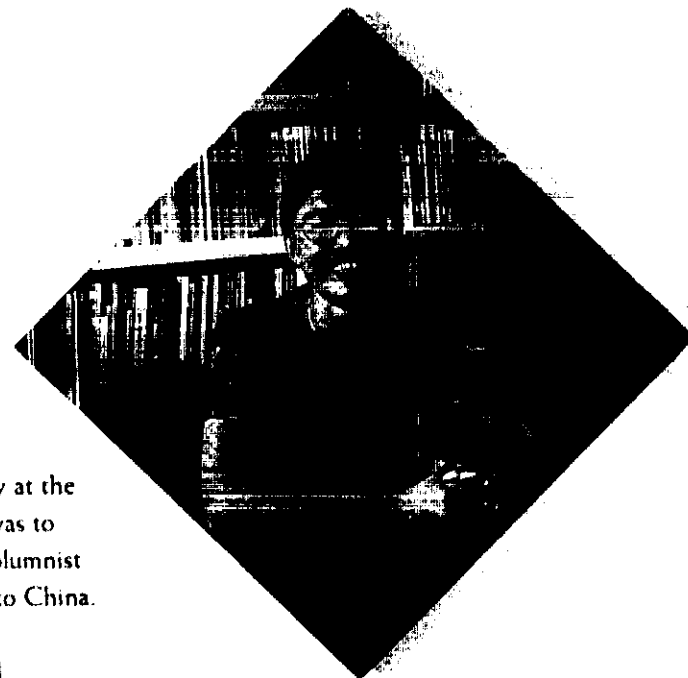
"When I graduated in 1990 from the Graduate School of Journalism of the Chinese Academy of Social Sciences I was given a position as the editor of the English edition of *China Environment News*, and that was really the first time I got to enter the field of environmental protection.

I feel very lucky that I had probably one of the best jobs in China because I had basically two roles to play at the newspaper at that time. As the editor of the English edition of *China Environment News* my responsibility was to introduce China, especially the environmental issues, through the newspaper to the outside world. As a columnist of the world environment for the Chinese edition of *China Environment News* I was introducing the world to China.

I came to know WRI when I was still in China. Then at the end of my graduate program in environmental policy at the University of Maryland, now that I was in the United States, I called to see whether there was any opportunity for me to do an internship at WRI. I was lucky again, and I've stayed at WRI ever since.


One thing that was in my mind for a long time was that I really wanted to work on China-related issues. After a few rounds of brainstorming, WRI made a decision, first, that we're going to work on China issues and, second, that we're going to work on environmental health issues. After this decision was made, I went back to China and interviewed all the people I could think of, including public health people, environmental people, decision makers, and researchers. That really helped out tremendously. In fact, I collected a lot of information. I understood much better the institutional barriers in China and how to deal with them — even today, the biggest challenges are the institutional issues.

But in the last two years, we've seen a lot of positive changes. For example, the China EPA has put environmental health on their agenda as one of the priority research areas. Environmental health is also included at the national level in a five-year plan priority research project. This signals very positively that people in China are realizing the importance of these issues. And they feel that WRI is really playing a very important role helping China to pursue a sustainable future."



Changhua Wu

**is director of China Studies
at WRI and president of the
Professional Association
for China's Environment.**



To Avert Dangerous Climate Change

Climate change poses risks of far-reaching, irreversible, unanticipated changes in natural systems and human societies. The solutions depend on the will of nations and businesses to work together to stabilize atmospheric concentrations of greenhouse gases.

WRI's work:

Promotes new technologies and new forms of enterprise to reduce global warming, while increasing prosperity.

Brings developing countries' concerns into international climate negotiations.

Analyzes the long-term causes and effects of climate change.

WRI deals with climate issues from the perspective of protecting both people and the environment.

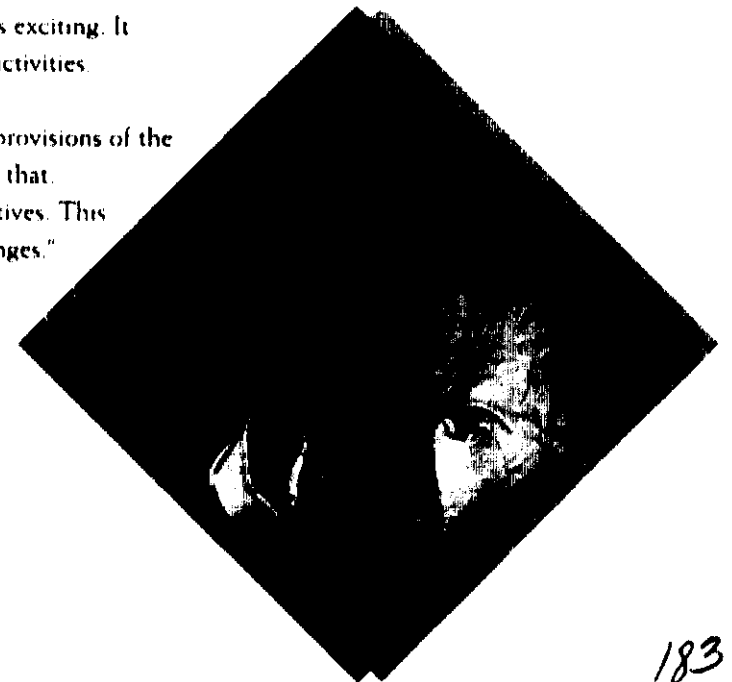
"Climate change is as much a development issue as an environment issue. WRI is really the only institution around that deals with these kinds of large-scale problems from the perspective of protecting both people and the environment. So coming to WRI seemed like a good fit for how I wanted to look at this issue and for how we're going to get the world's economies on a track to resolving the climate problem.

Most of the work we do on climate at WRI falls into three categories. First, the polarization within the business community led us to realize that we needed to work with the private sector directly to understand what they were concerned about and see how many we could help shift from being opposed or neutral to being neutral or supportive.

The second big area of work has to do with developing countries. Some of this work we do in partnership with developing countries, we also try to analyze the issues that seem most important to them. So we've looked at cumulative contributions of greenhouse gases. We've looked at per capita contributions, and we're starting to focus on contributions according to GDP level, because a lot of carbon emissions are associated with economic growth. So then the question is, How do we learn to put out fewer greenhouse gas emissions for every dollar of GDP that a country is earning? That's exciting. It requires technological change. It requires structural reform, pricing reform, and other good-government activities.

The third area of our work has to do with the rules of the game. Most of the rules for implementing the provisions of the Kyoto Protocol, which was agreed in December 1997, have yet to be written. So we're spending time on that. The Kyoto Protocol embodies some novel mechanisms to lower the cost of meeting the protocol's objectives. This includes various forms of emissions trading and raises important philosophical, legal, and practical challenges."

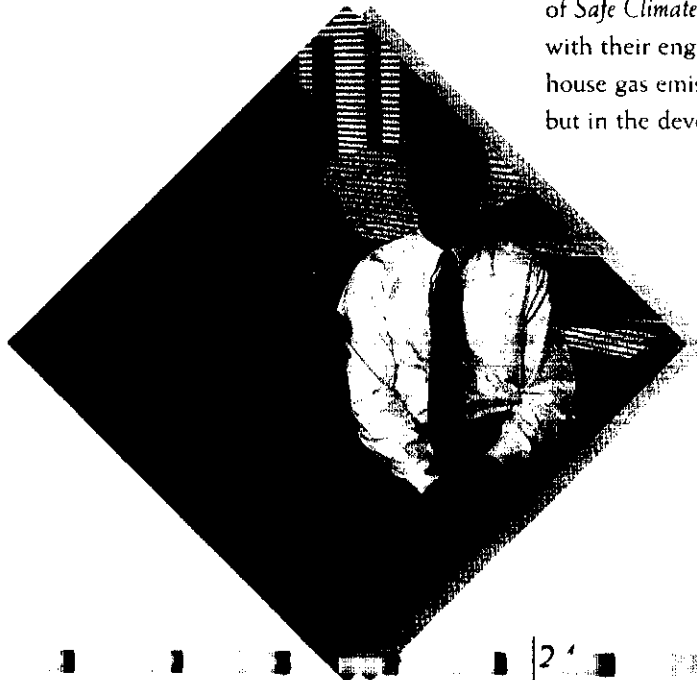
Nancy Kete, director of the Climate, Energy, and Pollution Program, recently joined WRI from the U.S. Environmental Protection Agency, where she was deputy director of the Office of Atmospheric Programs.



WRI believes that a safe climate and sound economy can coexist.

*Liz Cook and
Paul Faeth*

**Jointly led the Safe Climate,
Sound Business project in
1998. Liz is co-director of
WRI's Management Institute
for Environment and
Business. Paul is director
of the Economics and
Population Program.**



Liz: "Our Safe Climate, Sound Business collaboration is a project that we undertook with General Motors, British Petroleum-Amoco, and Monsanto to create a vision of the future that would include a safe climate and sound business environment. We picked those companies as partners because their industries had traditionally been opposed to action on climate change, but the companies themselves were willing to sit down and try to find a way forward with us."

I am excited to say that, even though we developed a vision of how to solve the climate problem over the next 100 years, we concluded that, because the issue is so serious, we need to act now. Together, we published a comprehensive action agenda. The action agenda is what gives us a great springboard for continued activities with the business community. At WRI, we combine an ambitious vision of the future with pragmatic steps for getting there. Provocative and realistic advocacy – rooted in solid analysis – is an effective way to engage policy makers and business leaders. It's what draws me to WRI."

Paul: "All of these companies that we've been engaged with are global companies. There are opportunities not just in the United States but in Europe and in many of the developing countries where they are expanding operations. After our release of *Safe Climate, Sound Business: An Action Agenda* in October 1998, GM invited us to visit their facilities in São Paulo to talk with their engineers. We met with the president to engage in conversations about how GM Brazil might also reduce greenhouse gas emissions. There are a lot of opportunities for a variety of companies to pursue, not just in the U.S. and Europe, but in the developing economies, too."

Dennis Minano,

chief environmental officer for General Motors,
worked with WRI staff on the Safe Climate,
Sound Business project.

"We are pleased to be part of this bold and innovative approach where a unique combination of auto, oil, life sciences, and environmental organizations has constructively addressed the global climate issue with an action agenda that includes technology advancement and flexible market-oriented policies."

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WRI has pledged to reduce its carbon emissions to zero by 2005.

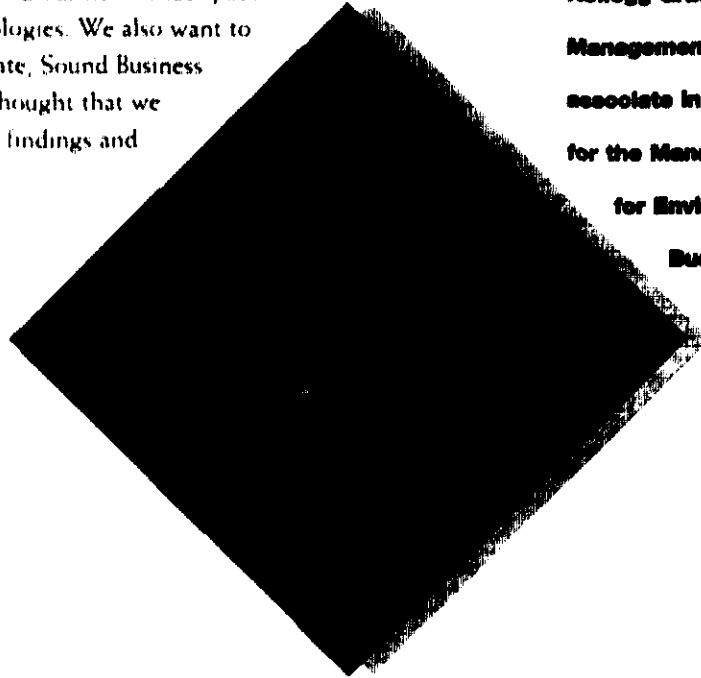
Rob: "We've been working on a grass roots project within WRI to reduce our carbon dioxide emissions. Even though WRI isn't a big factory with smokestacks, we're responsible for quite a lot of emissions. Anytime you turn on a lightbulb, use a piece of paper, drive your car, or take a plane ride, you are using carbon-based fossil fuels. Burning those fuels releases carbon dioxide into the atmosphere, which traps heat, just like a greenhouse."

Gwen: "WRI is committed to going from slightly over 2,000 tons of carbon dioxide emissions a year down to 1,300 tons a year by 2001, which represents a 7 percent reduction from our 1990 emissions—the same level of reduction countries are being asked to make under the Kyoto Protocol. We've committed to reduce our net emissions to zero by 2005."


Many people think that addressing climate change is difficult and expensive. We know that it's not. There are a lot of simple steps that make sense, that are more efficient, and that improve our environment in other ways, so we want to take advantage of those opportunities. We have designed our new office space to incorporate energy-saving lighting, appliances, and communication technologies. We also want to do anything that contributes to our other work at WRI. In the Safe Climate, Sound Business report, we set out an action agenda for businesses and governments. We thought that we should put our own recommendations into practice. We'll be reporting our findings and our progress at <http://www.wri.org/wri/press/co2comm.html>."

Gwen Parker and Rob Day

are leading the effort to
implement WRI's
commitment to reduce
our carbon dioxide
emissions. Gwen is a
research analyst in the
Economics and Population
Program. Rob, now at the
Kellogg Graduate School of
Management, was an
associate in corporate change
for the Management Institute
for Environment and
Business Program.



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To Increase Prosperity while Improving the Environment

To meet the aspirations of a growing population, we need to produce food without spreading toxic pesticides and fiber without degrading frontier forests. We need to develop energy sources without polluting the atmosphere and provide transportation without relying on internal combustion. WRI is setting the agenda for businesses to provide these goods and services without destroying the environment.

WRI's work:

Encourages the information technology industry to create profitable markets that will also protect the climate, promote development, and improve environmental management.

Provides information to capital markets worldwide that will lead them to reward environmental leaders.

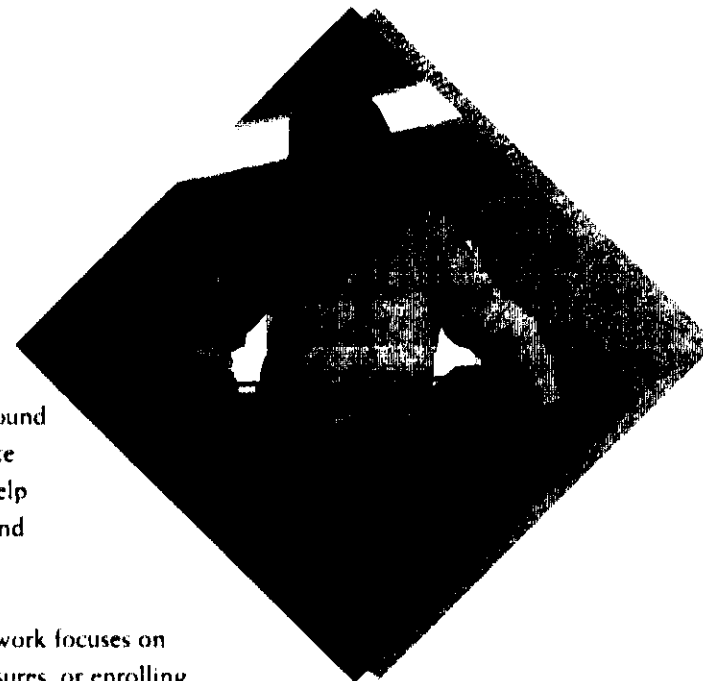
Helps business schools in North and South America to train future leaders in sound, sustainable business practices.

WRI is opening dialogues to change business choices.

"Ten years ago I could not find a job that would take advantage of my MBA and my years with IBM, while allowing me to pursue my passion for protecting the environment. So I tried unsuccessfully to start several for-profit enterprises to clean up the environment and then had great success with MEB. We found that business people were receptive to the message that investments in a better environment could generate competitive advantage. We set out to prove it with case studies, to help business schools teach it, and to help companies do it. Then we found WRI, and it has been a great marriage of policy and practice, of science and management, and of the private and public sector.

Since the merger with MEB in 1996, WRI has engaged the business community in many ways. The MEB work focuses on business problems, such as making a financial case for protecting the environment, developing better measures, or enrolling business champions in the effort. We work on building demand for more sustainable products. We have worked with more than a dozen companies, including DuPont, Johnson & Johnson, Collins & Aikman, and Placer Dome. MEB also has an initiative that is developing new ventures in Latin America, and now in the U.S. We have a big effort to bring more environmental awareness to business schools in the U.S. and Latin America, and one emerging in China.

Two other areas in WRI have picked up on the value of connecting with industry. Both the politics and the action on climate are largely in the hands of industry, so the climate team has been engaging with companies like British Petroleum-Amoco, General Motors, and Monsanto. There's also a lot of work with the forest products industry. We are working with Macmillan Bloedel, which has made strong commitments to sustainable forest management, to analyze the financial benefit of these commitments and communicate our findings to Wall Street. We are also working with big forest product buyers, such as Home Depot and Ikea, to research the implications of buying more sustainably harvested wood."



Matthew Arnold

is senior vice president and chief operating officer. He founded the Management Institute for Environment and Business (MEB) in 1990 to help business schools and corporations integrate environmental issues into business strategy.

WRI is creating the market for investment in green enterprises.

Patricia Londoño

**draws on her business
experience in Colombia as
director of Latin American
Business Enterprises and
New Ventures within WRI's
Management Institute for
Environment and Business.**

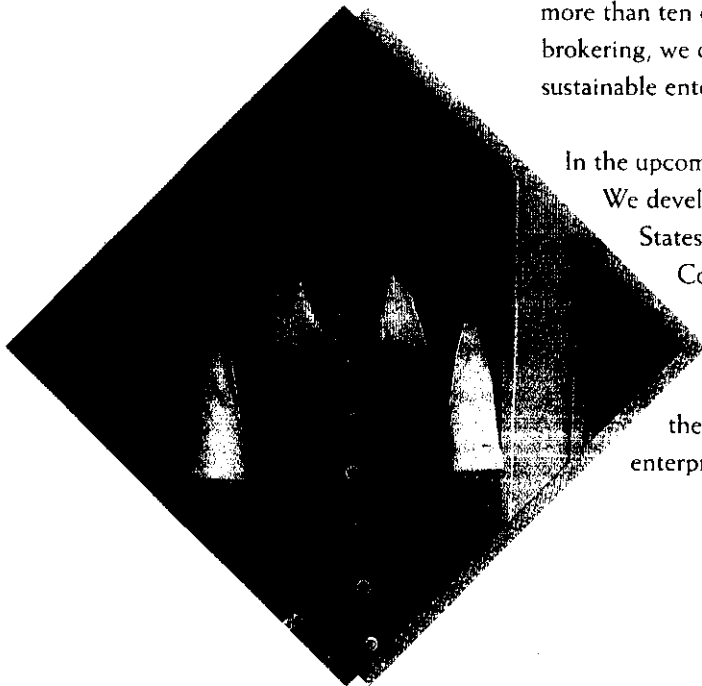
"The objective of the New Ventures project is to foster Latin American environmental enterprises as a means of promoting social, environmental, and economic equity in the region. Our strategic starting points are Central America, Colombia, Brazil, and our sectors of focus are renewable energy, ecotourism, sustainable agriculture, sustainable forestry, information technology, and cleaner production.

Our initial objective was to support five to ten companies, by providing business development services and access to large-scale financing, but we're more ambitious now in terms of the impact that we want to see in the region. So we're building the mechanisms through which hundreds of environmental enterprises will reach financing.

Over the last year and a half we have worked as a business advisory service with model enterprises. Our demonstration enterprises ranged from small, early-stage companies — such as Comercio Alternativo, a Costa Rican distributor of organic food products — to a start-up enterprise that provides alternative fibers for cushions and dashboards in a joint venture with a multinational car company. We realized that the demand for our services far outstrips our capacity to deliver; there are far more than ten enterprises in need of business development services. So, we are creating a capital brokering service. By brokering, we can more efficiently mobilize resources, both human and financial, and direct those resources into sustainable enterprise.

In the upcoming year we will launch the first Latin American Environmental Business Competition and Investor Forum. We developed the competition and forum as the regional counterpart of the successful models used in the United States and Europe to promote entrepreneurship and investment. We've also created the Environmental Enterprise Corps (EEC), a corps of business and technical professionals, business faculty, and students, who will offer business development services to our environmental entrepreneurs.

The competition will generate a significant flow of proposals; the EEC will filter and improve the quality of the business plans; and the forum will serve as the brokering grounds for the best investments in environmental enterprise in Latin America."



WRI is encouraging companies to tap new environmental markets.

"I have worked with WRI since its inception, initially as a Congressional staffer dealing with policy issues. I've seen the cutting-edge work that WRI has done over the years feed right into the public policy arena with great ideas of what needed to be changed. WRI has always had a high reputation, both domestically and internationally.


When I came to WRI in 1998, I thought bringing my expertise in the digital networking field would fit very nicely with some of the things that were being discussed within MEB and the initiatives on climate and forestry. For example, building upon WRI's report, *Taking a Byte Out of Carbon*, done in conjunction with Electronic Industries Alliance, we've started looking at how we can get digital companies excited about investing in clean, climate-friendly energy technologies such as photovoltaic systems (PV). PV is currently cost-effective for many of the 2 billion people without access to electricity. Rural PV systems can be competitively marketed for the equivalent of \$1.25 per kWh, less than many of these folks now spend for kerosene and other alternative power sources. Furthermore, PV micro-power offers one of the most climate- and environment-friendly forms of electricity generation.

PV micro power also enables powerful applications of digital technologies, such as delivering cooperative extension services, promoting self-paced learning, facilitating community health training and telemedicine, and creating opportunity for global trading of village crafts via wireless satellite communication capabilities.

The aggregate market opportunity through micro-power is enormous. The Micro-power for Micro-enterprise project is helping to accelerate the pace at which this new technology is adopted. We are encouraging computer and wireless communication services to tap into and expand this vast market for wireless power."

Michael Totten,

**co-director of WRI's
Management Institute
for Environment and
Business, won the 1999
Lewis Mumford Award for
contributions to the
environment.**



A Commitment to Put Ideas into Action

For hundreds of years, enterprises have expanded and national economies have grown by using more resources, burning more energy, creating more waste. That economic growth has improved human well-being dramatically by providing more goods and services, by creating more opportunities for trade and employment, and by underwriting more investments in technology and education. But the historical process of growth has also degraded biological resources, depleted energy supplies, and polluted the water, the land, and the air.

WRI believes the remedy to environmental problems lies not in reducing growth, but in breaking the connection between expanded prosperity and depleted resources. We are working with governments, businesses, and civil society to find new ways to use resources more efficiently and to take advantage of new technologies and new markets.

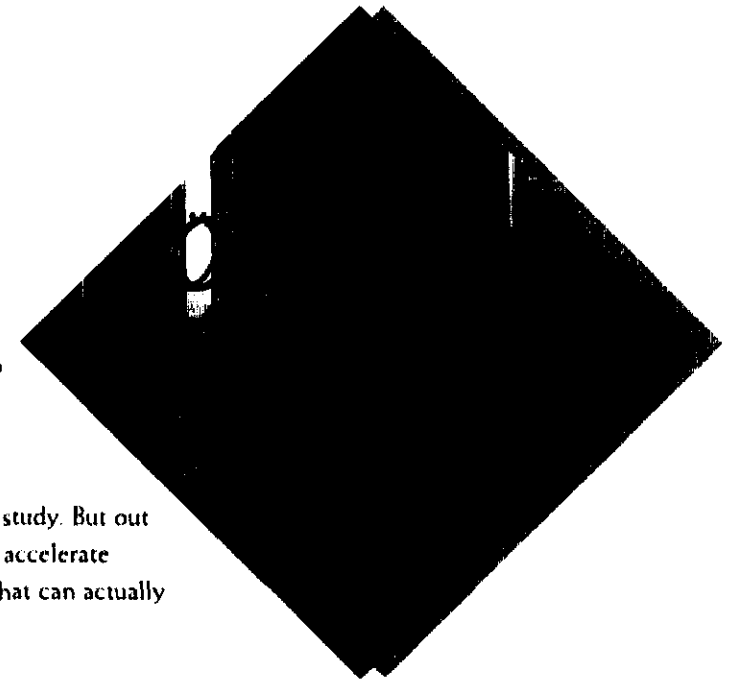
WRI is more than a think tank.

"WRI is evolving into being more than a think tank. Here's a perfect example. Starting in 1992, I was involved in the 2050 project that WRI did with Brookings and the Santa Fe Institute. We were looking at long-term sustainability issues over the next 50 years. Out of that came my book, *Which World? Scenarios in the 21st Century*, published in 1998, which has opened some new audiences to WRI because it speaks in journalistic language about scenarios for the future.

When we started the 2050 project on long-term sustainability, it was a fairly analytical, academic kind of study. But out of that book came some ideas about how one might use these emerging new information technologies to accelerate development. WRI is now carrying this forward, beyond the inception of the idea, to form partnerships that can actually put the idea into action.

For example, I've helped with others to develop our Communication 2000 Program. This internal capacity-building effort applies new communication technologies in areas where we see the greatest need for future growth: to expand WRI's outreach and facilitate work with partners. In combination with some of the digital map tools and indicators that WRI has been developing, these new communication channels will give someone managing a forest, grassland, or watershed in a developing country access to information tools never before available. And, of course, there are a lot of resource managers in the world, and that looks like a market, both to the people who sell the software or provide the communication links and to those who provide the data.

From these projects came the idea to develop a private sector conference on the use of information technologies for sustainable development, both for increasing human welfare directly around the world and for enabling better management of natural resources. The idea is essentially to use these very powerful technologies for a broader purpose, which is largely one that the companies involved haven't understood might be an important market for them. So we're starting by developing this conference as a way to bring producers and potential users of technology together. By bringing them together, we can help them to form partnerships that will put the idea of sustainable development into action."



Allen Hammond,
**WRI's senior scientist
and director of strategic
analysis, provides
leadership for introducing
new analytic approaches
and new communication
technologies.**

Recent Partners

Agencies and Organizations

ARGENTINA

Ambientales
Fundacion Argentina de Recursos Naturales (FARN)
Fundacion Educambiente
Universidad de Ciencias Empresariales y Sociales-Instituto de Estudios Investigaciones

AUSTRALIA

Center for Innovation and Research in Environmental Education,
Griffin University

AUSTRIA

University of Vienna

BRAZIL

Centro de Estudios de Cultura Contemporanea
ETHOS
Faculties of Medicine and Environmental Sciences at the University of Sao Paulo
FUNBIO
Fundaco Getulio Vargas Pronatura
Santa Úrsula University
Secretariat of Environment for the State of Sao Paulo
State of Sao Paulo Pollution Control Agency
Sustainable Development, Inc.
University of Campinas
University of Sao Paulo

CAMBODIA

Mekong River Commission

CAMEROON

Cameroon Environmental Watch
Center for International Forestry Research (CIFOR)

Central Africa Regional Program for the Environment

Centre de Télédétection et de Cartographie Forestière (CETELCAF)
Centre International d'Etudes Forestieres et Environnementales (CIEFE)
Centre pour l'Environnement et le Development
World Wildlife Fund

CANADA

BC Wild in Canada
CPAWS Edmonton
Federation of Alberta Naturalists
Grand Council of the Crees
Great Lakes United
International Institute for Sustainable Development
Manitoba's Future Forest Alliance
Ocean Voice International
Quebec Environmental Network
Saskatchewan Environmental Society
Sierra Legal Defence Fund
Wildland's League - CPAWS
WWF Endangered Spaces Campaign, Alberta
WWF Endangered Spaces Campaign, Saskatchewan
Yukon Conservation Society

CENTRAL AFRICAN REPUBLIC

Project d'Aménagement des Ressources Naturelles

CHILE

Centro de Investigación y Planificación del Medio Ambiente (CIPMA)
Comité Nacional Pro Defensa de la Fauna y Flora (CODEFF)
Concepcion Universidad
Corporación Nacional Forestal (CONAF)
FAO Latin America Network on Protected Areas
Instituto Forestal

Universidad Adolfo Ibanez
Universidad Austral

CHINA

Be Con Energy Research Institute (ERI)
Beijing Energy Research Institute
Centre for Biodiversity and Indigenous Knowledge
Chinese Academy of Sciences
Hong Kong Polytechnic University
Committee on Environment, Geography
Institute for Environmental Sciences,
Beijing Normal University
Environmental Education Research Institute,
Guangzhou Teacher's College
Environment Protection Agency
Institute of Environmental Economics at Renmin University
National Environmental Protection Agency (NEPA)
Research Center of Ecological and Environmental Economics, Chinese Academy of Social Sciences

COLOMBIA

Asociacion Nacional De Industriales (ANDI)
Colombian Council for Sustainable Development
Consejo Empresarial Colombiano para el Desarrollo Sostenible (CECODES)
Conservacion International-Colombia
Corona Foundation
Corporacion Innovar
ECOFUNDO in Colombia
Federacion Nacional de Cafetaleros de Colombia
Fundación FES in Colombia
Fundacion ProSierra Nevada de Santa Marta
Fundesarrollo
Fundescol
Universidad ICESI
Instituto Alexander von Humboldt
Ministerio del Medio Ambiente
Ministry of the Environment

National Industry Association
Promocion De La Pequeña y Mediana Empresa Ecoeficiente Latinoamericana (PROPEL)
Universidad de Los Andes

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Mustafa K. Tolba

was executive director of the U.N. Environment Programme before becoming president of the International Centre for Environment and Development in Cairo.

"I was a founding father of the World Resources Institute, with Gus Speth. When I see now where it has come since the beginning, I am proud to say that it is one of the most qualified institutions in the world to speak on environmental policy issues. WRI is having a major impact."

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