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COMPETITIVENESS PROJECT SUMMARY

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I. Environment as a Competitive Advantage

In 1993, MEB entered into a cooperative agreement with the EPA to examine Michael Porter's hypothesis that innovative companies responding to environmental regulation can create competitive advantage through lower costs or higher sales. With Professor Porter's guidance, we conducted studies of six global industries (see chart) to understand how environmental regulation was influencing competition.

In 1994 and 1995 we conducted five additional industry studies, as well as three individual company studies. These studies complemented five company studies MEB had earlier conducted with EPA looking at the competitive opportunities of 'beyond compliance' investments. Finally, in 1996 we conducted financial assessments of two industries and an additional company to look at the financial and stock market impact of environmental performance. In addition, MEB has conducted at least 40 additional case studies as well as hundreds of interviews, seminars and workshops. All this work has focused more or less on the relationship between business performance and environmental stewardship.

MEB/EPA Case Studies

Industries	Companies
Pulp and Paper*	AES
Paint and Coating*	AT&T
Electronics*	BMW
Batteries*	Carolina Power and Light
Printing Inks*	Dow Chemical
Refrigerators*	General Motors
Electric Power	IKEA
Metal Finishing	Northrop
Recovered Paper	Weyerhaeuser
Polyvinyl Chloride	
Laundry Detergent	
Property and Casualty Insurance	

This work reveals highly varied outcomes. We have found ample indication that environmental pressures can increase or decrease the value of a business, and often have no material impact on value. In many cases business outcomes are negative; environment adds cost, forces unproductive investment, closes markets, or eliminates technology options. However, in many instances the results are very positive; environmental pressure forces management attention to environmental issues and results in reduced cost, superior product performance, new markets, and more robust business health.

The case studies and financial analysis conducted as part of this work assess the business competitiveness of individual firms. We focused on competitiveness within an industry. Measures we routinely examined include costs, process yield, product performance, sales and market share. It is important to note that we did not examine the competitiveness of countries. Hence, we do not answer the question are environmental regulations good for the economy? We begin with an assumption that regulations to protect the environment are a beneficial and necessary aspect of business.

This work can inform regulators about business response to various regulations, and educate them about business decision-making. It also provides a rich and detailed range of experiences

that tell a very important and very inconsistent story. A brief summary of the twelve industry cases is included in Appendix A. Our conclusions are as follows:

- Environmental pressure can be a significant determinant of competitive advantage, particularly in industries with low profit margins, high pollution loads, and heavy resource and capital intensity.

- The financial resources devoted to environmental investments are substantial and understated. Most reported expenditures are for pollution abatement and control. Investments in pollution prevention, eco-efficiency, and product stewardship are often unmeasured and unreported.

- Businesses that identify synergy between environmental goals and business goals, and integrate environmental considerations into the business process, are most likely to gain a competitive advantage from environmental investments.

- Environmental investments that are disconnected with the business process usually add cost to the business with no corresponding business benefit.

- Senior management commitment to environmental issues - indicated in mission statements and policies, investment guidelines, operational focus and organizational design - results in superior environmental performance and business opportunities.

- Quantitative stock price and financial analyses do not reveal a strong short term relationship between environmental performance and competitive advantage, indicating that environmental factors are often less important to the short term financial success of a business than other factors such as market prices, economic growth, and technology.

II. Environmental Pressure

When we began this project in 1992, we initially equated environmental pressure to regulatory pressure. Although regulatory pressure remains a major driver of environmental investments, non-regulatory market pressures are gaining more influence on corporate behavior. As we examine environmental pressure in studies today, we consider regulation as one driver, but consider stakeholder and market drivers as well.

1) regulation
A command and control regulatory system operates to ensure widespread adoption of demonstrated technology. Every enterprise affected by a regulation will have roughly the same compliance strategy. Opportunities for business gain or cost reduction are limited. This assures regulators and society of a minimum environmental standard, but inhibits innovation. More flexible approaches to regulation set a performance goal, and allow regulated enterprises ample room to develop innovative pathways to compliance. Without stringent enforcement, flexible approaches are prone to greater uncertainty. However, flexibility also opens the possibility that enterprises will develop lower cost methods of achieving desired levels of environmental performance, or will exceed proscribed levels with superior technology. The chart below indicates the competitive dimensions of differing regulatory approaches.

Competitiveness Impact of Regulatory Pressure

Regulatory Aspect	**Opportunity for Differentiation**	
	low	**high**
structure	technology	performance
focus	points of emission	environmental outcome
process	conflictive	collaborative
goals	incremental	stringent
enforcement	weak	strong
time to comply	short	long

When regulations are best characterized by conditions in the right column there is greater opportunity for an individual firm to develop more competitive solutions to the environmental problem being addressed. They will have more time, a clearer sense of the regulatory goal, more leeway to develop an economically valuable solution, and more collaborative relations with the regulators designing the solution. In exchange for this accommodation, they will have a higher hurdle to cross.

The German effort to develop a system for the disposal of motor vehicles is a good example of this kind of process. The regulatory agency, BMU, began discussions with the industry two years before its draft proposal to a establish take back infrastructure for autos. The industry responded with research and development. After six years, the system became law in early 1996, requiring all manufacturers of automobiles in Germany to take them back from their final user and reuse/recycle/dispose of the scrap vehicle. BMW in particular capitalized on the relatively higher value and lower volume of BMWs that would enter the take back system. BMW encouraged take back, and has gained a cost and market advantage against several of its competitors.

2) stakeholders

In addition to regulation, companies are being held increasingly accountable by external stakeholders for their environmental performance. This accountability often goes beyond regulatory requirements; meaning it is no longer enough to simply comply with the law. Pressure from increasingly vigilant communities, from a distrusting public, from shareholder activists and from increasingly effective advocacy organizations is changing the social contract between companies and their constituents regarding the environment.

Growing Power of Stakeholders Creates Opportunities

Stakeholder	**Stakeholder Power**	
	Weak	***Strong***
community	trusting	vigilant/empowered
public/consumer	uninformed	concerned
shareholder	indifferent	supportive
advocacy groups	hostile/fragmented	coordinated
industry	defensive	proactive

For individual companies these more powerful stakeholders can become valuable partners in efforts to differentiate from competitors. Companies that have strong stakeholder relationships accrue numerous benefits:

- boosted image
- validation in the market
- benefit of the doubt in crisis
- flexibility for facility expansion or modification
- pride and morale of the workforce
- recruit better employees

The power of these stakeholders has created a movement within industry groups to establish standards of leadership for their members. The Sustainable Forestry Initiative of the American Forest and Paper Association and the Responsible Care Program of the Chemical Manufacturers Association are two very different efforts to raise performance expectations of members, and to forestall further public intervention in their industry's practices.

We draw two lessons from the changing forces affecting the environmental performance of enterprises. First, the increasing number and diversity of legitimate stakeholders has created a complex management challenge for most companies. The pressure to perform well has never been higher, nor have demands for public accountability. On the other hand, companies benefit from a higher level of flexibility in meeting demands than they have before. Demonstrations of commitment and of progress are apt to generate trust and collaboration. The binary world of compliance is getting blurred. The most successful companies are reaching out to stakeholders, assessing demands, making commitments, and investing in real change.

III. From Pollution Control to Sustainable Enterprise

MARKET DRIVER	Franchise / Reputation	Efficiency	Product Performance & Quality	Market Transformation
ACTIVITIES	•Regulatory Compliance •Outreach •Public Affairs •Stakeholder Partnerships	•Pollution Prevention •Materials Accounting •Process Control •Energy Conservation	•Design for Environment •Take-back •Product Stewardship	•Clean Technology •New Market Development •Sustainability Assessment
BENEFIT	•Cost of Business •Public Trust	•Cost Reduction	•Revenue / Market Share	•Revenue

The simultaneous increases in accountability and flexibility that emerged in our cases have yielded a diverse array of investments in environmental protection. They are often categorized by the primary focus of the investment, as illustrated below:

I.	II.	III.	IV.
Pollution Control	Pollution Prevention	Product Stewardship	Sustainable Development

Each succeeding area of investment moves further away from the waste stream, and closer to the core strategy of the company. Companies move in stages from a focus on waste streams, to a focus on processes, then products, and finally to strategies of sustainable enterprise. As the investments get closer to business strategy, they are more likely to yield fundamental changes which dramatically reduce environmental burden and increase competitiveness.

I. Pollution Control

Investments to clean up or control pollution are the largest recipient of environmental investments in virtually every case we considered. Driven by regulations designed to control pollution in water, air and land, these investments account for nearly 2% of GNP in the US. At the company level environmental operating expenses account for 1-5% of sales, and environmental capital investment consumes 5-40% of total capital investment. Wide variances occur between industries of course, depending on pollution loads.

These investments encompass capital and operating expenses for water treatment, air filtration, waste treatment and disposal, and site remediation. They focus on waste streams, and are added on to the production process. They rarely generate a financial return, unless excess capacity is marketed as a service. Moreover, they often create a disincentive to future investment in waste minimization or other changes in the business process that would reduce environmental burden. As fixed assets, they are capitalized and depreciated. Reducing their utilization does not necessarily reduce their cost.

For instance, the US pulp and paper industry was required by the Clean Water Act to build secondary treatment systems for effluent from pulping and paper-making. These investments

created a disincentive to recycling process water, which was not yet technically feasible due to the corrosive effects of the bleaching agent, chlorine. Using water efficiently would not reduce the cost of the secondary treatment plants. However, Scandinavian mills did not have the treatment requirements (because their receiving waters were ocean and sea), and had invested throughout the 1970's in chlorine-free bleaching technology that would enable water reuse. Hence, they were better positioned than their US competitors to respond to the discoveries of dioxin in mill effluent. The two predominant bleaching technology vendors in Scandinavia have established markets in the US.

As expenses for pollution control have grown more significant, and as stakeholders have placed additional demands on companies, it has become obvious that there are much cheaper ways to reduce pollution than by cleaning it up. As in the bleaching case, that recognition created a market for cost effective solutions to new environmental demands. Indeed, investments in clean technology have had a greater impact on the companies we studied than pollution control requirements. Higher environmental demands have shifted entire markets - pulp and paper, refrigerators, batteries, etc. - toward cleaner products.

At one point the largest driver of research and development in the paint and coatings industry was Clean Air Act requirements that manufacturers reduce VOC emissions when coating products. The investments in aqueous, powder and other coatings that resulted were not reported as environmental, and did not appear in the pollution control cost data. This was true in many of the industries we studied. As markets shift to cleaner products and processes, driven by regulations and stakeholder pressure, vast sums of money are invested and financial returns generated. That impact is far greater than the capital invested in pollution control.

II. Business Process - Pollution Prevention

The first step in integrating environmental protection into the business process is to focus on pollution prevention. Most pollution prevention is focused on the manufacturing process, and has become a source of significant cost savings to thousands of companies. The best documented case of pollution prevention has been 3M's Pollution Prevention Pays program, which reportedly reduced costs by $500 million over a decade. Virtually every company we examined had active pollution prevention initiatives., and most are developing it into a mindset that all manufacturing personnel - process engineers, operators and technicians - adopt as a way of business. The message "waste is cost" makes perfect business sense, and has been formalized by the Business Council For Sustainable Development into 'eco-efficiency'.

Pollution prevention makes the business more competitive in at least four ways. First, it is an opportunity to reduce production cost. Second, it helps to increase yield on raw materials. Du Pont has driven yields above 90% in some of its businesses with help from their pollution prevention mindset. The improved yield leads to incremental revenue, as material previously discarded is now sold as product. Finally, the quality of the process, as measured by defects and scrap, usually goes up with a pollution prevention program.

These dynamics are well illustrated in DuPont's pollution prevention efforts in a business that makes Corian, a premium synthetic counter top. Because of its premium price point, product with the slightest nicks or cuts had to be scrapped. It was cut in 12 foot sheets, making handling an awkward affair, and leading to substantial scrap. When they analyzed the cost of the scrap, it was significant, including:

- waste disposal
- raw material cost
- value added
- product revenue

These cost items are listed in ascending order of magnitude, with lost revenue accounting for much of the cost. Several product teams set to work, and develop several new applications for the Corian scrap, including art supplies, writing tablets and pens casings. DuPont now recover most of the Corian, and dramatically reduced costs, improved yield and captured additional revenue.

In several cases, pollution prevention has transformed industries. A great case in the metal finishing industry concerns a steel galvanizing company called Bosch, headquartered in Santiago, Chile. Bosch was one of the largest galvanizers of steel in Chile when their CEO set out to reduce the amount of hazardous effluent his process generated. His galvanizing process was a hot and messy affair, with hydrochloric acid washes and molten zinc. Effluent from the process contained hazardous acids, heavy metals and was put right into the municipal sewer system. At the time he began his effort, Bosch's performance was as follows:

Cost / ton	$600
Litres/ton	1,000
Delivery	three weeks

His research revealed that a lack of control over the process was forcing Bosch to change baths frequently. Meaning they had to discard contaminated zinc, acid and caustic. By exerting greater control over the process, they change baths less frequently, sped up the process, and reduced effluent. Performance after a new plant was built:

Cost/ton	$250
Litres/ton	30
Delivery	three days

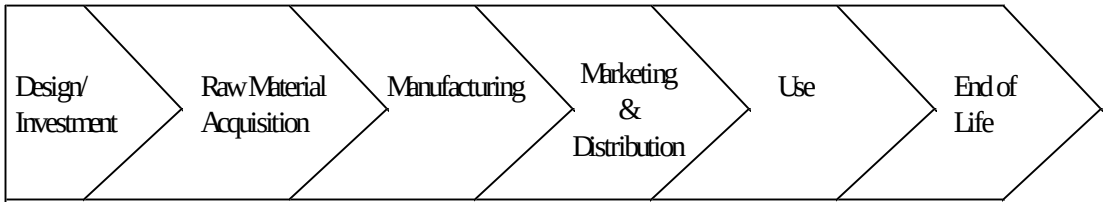
Bosch has become the dominant galvanizer in Chile, and is expanding rapidly. Their competition has suffered, and is now copying Bosch's methods. The best lesson from Bosch is not what they did. It is that no one in the industry believed the situation could be improved, and everyone thought Bosch was foolish.

Pollution prevention is about to be given a major boost in the form of ISO 14000, a voluntary set of international standards for environmental management. Certification to ISO 14000 will likely become a prerequisite for any firm exporting to Europe, and probably elsewhere. The standards place significant emphasis on pollution prevention, and early results from companies that have implemented the standards indicate ample cost saving from pollution prevention projects identified as part of certification.

III. Business Process - Product Stewardship

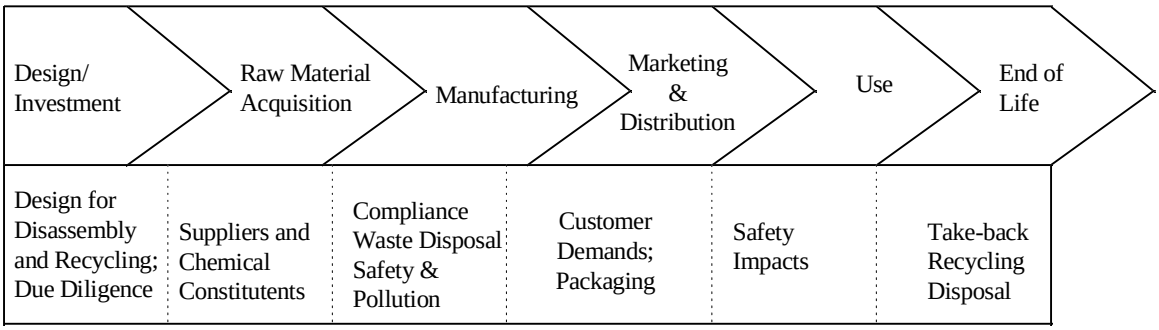
The limitation of pollution prevention is that it focuses primarily on the production process, and not on the whole business system. If we consider a generic value chain, as shown below, we can see that value is added at many points in the chain. Focusing on manufacturing is limiting from an environmental point of view, because it misses product design, content, use and disposal. It is even more limiting from a business point of view, because most businesses are driven predominantly by the product managers, not the manufacturing managers.

As companies gain control over their processes, they begin looking for opportunities to build environmental performance into product design. This is powerful, because the leverage in



design is immense. As much as 80% of the environmental impact of products is determined at the point of design. The value chain shown above was used by a major electronics company to illustrate the points of intervention for environmental improvement of the product, and of the business.

Perhaps the most important item on that chart is the customer demand. Most companies are acutely responsive to their customers. When the customer requests that a product be changed



for environmental reasons, in most cases that is enough rationale to do so. The spread of ISO 14000 will be through customer demand, the elimination of VOC in paints is through customer demand, the removal of chlorine from paper-making is through customer demand, etc. In many cases an environmental problem is best solved by a supplier. The environmental pressure on a customer creates a market opportunity for the supplier. If the firm is vertically integrated, as many are in the pulp and paper industry, the supplier may be another business unit within the same company. But in the paint and coatings, electronics, metal finishing, electric utilities and other cases, the supplier - customer interface is where innovations occur and value is created.

Apart from specific customer requests, the most successful examples we see are when the cost and performance of the product are enhanced along with environmental improvements. Companies in every industry we studied are seeking ways to improve the performance, lower the cost and lower the environmental burden of their products. Thinner sheets of paper use less resources, but tear more easily. Aqueous paints have no VOC, but lose their luster more quickly. Butane refrigerators use no CFCs, but may explode. Dry cell batteries do not use cadmium, but may not hold a charge. The companies that get beyond these trade-offs, as have individual firms in every instance cited, they improve their environmental performance and their business performance simultaneously. Weyerhaeuser developed stronger fiber, ICI and BASF perfected aqueous paints at a lower cost than VOC paints, Whirlpool developed aqueous coolers and several companies are racing to win the dry cell battery market.

IV. Sustainable Enterprise - A Market Focus

Environmental and social pressure creates demand for products and services and companies that reduce burden on the environment and improve the lives of people. Sustainable enterprises learn to anticipate that demand, and create market opportunities from it. Sustainable enterprises seek ten times the performance at one tenth the cost with no environmental impact and full community participation. They break technical barriers; they rearrange industries; they create new ways of doing business. No company we have ever studied has achieved full sustainability. But big parts of big companies and of small companies - DuPont, Monsanto, Weyerhaeuser, AT&T, British Petroleum, S.C. Johnson Wax, Collins Pine, Interface, AES, Church & Dwight - are organizing themselves and their industries to create a new basis for competition.

Sustainable Enterprise is a revolutionary notion. It requires the abandonment of the investment paradigm that treats waste streams. It requires every single individual in an organization to share a common understanding of innovation, efficiency, and the possible. It requires investment in 're's' - respect, re-use, recycling, renovation, resurrection, restoration. It requires a culture of improvement, not condemnation.

Sustainable enterprise resonates with people. It says that the good things in life - clean water, crisp air, blue skies, live game, fresh trout, stable communities, unlocked doors - are not only possible but profitable. It says bring those values to work. Hold us to a higher standard. Let's innovate our way out of pollution and poverty into perpetual re-use and business success. Why do all this? Because it may become one of the greatest business opportunities in the history of commerce.

From an ecological perspective, sustainability means using fewer resources, and closing resource loops. Closing the loop often requires industry wide collaboration, and the participation of upstream and downstream industries. It means investing in renewable resources, and conserving non-renewables. It means using fewer toxic substances.

From a socio-economic perspective, sustainability means improving the communities in which one operates, returning wealth to employees, investing in infrastructure, education and health. It means investing to meet basic needs, and not catering to luxuries.

From a business perspective, sustainable enterprise means finding ways to accomplish the two above that also enhance the business.

IV. Management Transformation Toward Sustainable Enterprise

In the course of our case studies, we usually consider the managerial factors that distinguish leading companies from their competition. Perhaps not surprisingly, companies that are aggressively engaged in environmental leadership demonstrate certain common organizational and human resource characteristics. They focus on value; they hold a long term vision; and they invest to match their vision. These managerial transformation is under way in many companies, and has not even been discussed in most. We are among the leaders when we identify these changes, the top 1%. Even in this group, change is erratic and inconsistent. Progress is made under one leader, and regresses during a transition. Parts of a company may be strong - individual business units or functional departments - but rarely is the entire company engaged in sustainability.

We have identified four categories of management activity in which leaders differentiate themselves from their competition. Leaders integrate environment into their mission and values, into their strategic investment, into their operations, and into their organization and culture. Importantly, these companies seek to gain competitive advantage from this managerial integration.

Competitive Differentiation of Sustainable Enterprise

Mission and Values

Most companies that have taken a lead on environment and sustainable development have articulated a mission or a set of values that characterizes their sense of purpose. Some of these companies have changed their core mission statements; others have created statements that single out sustainable development. Of course, these statements are not worth much if the company does not behave accordingly; and there can be no assurance that they will. However, mission and values statements are a very public and symbolically important signal to all constituents about a companies intentions.

One of the most values driven companies we have studied is the AES Corporation, the world's largest global power producer. AES is among the most financially, socially and environmentally successful companies in any industry. Their people are fundamentally driven by their four core values: fun, fairness, social responsibility and integrity. Managers in this company make recruitment decisions on these values, their is an annual values survey to determine the companies success at adhering t them, and financially attractive investments are occasionally rejected because of inconsistency with the values. Notice that environmental leadership is not an individual value. The company believes that environmental stewardship should be embedded in the values, and not singled out. It is a fundamental part of all four values.

In formal letter, Monsanto Chairman Robert Shapiro writes,

> "We are increasingly convinced that Monsanto's role cannot be limited to reducing the negative impact of our operations, although that must, of course, continue to be a major part of our efforts…This means that we have to broaden our definition of environmental and social responsibility to include working toward 'sustainable development' - 'sustainable' because countless generations will need to live on this planet, 'development' because they should not be condemned to live in poverty."

Monsanto, and many others in the chemical business, have obviously been actively engaged with environmental forces for many years. In recent years, CEOs of the major chemical companies have articulated stewardship as a value for themselves. These statements are often backed up with significant action.

Large companies in virtually every industry have articulated statements like these, although rarely so ambitious. Most often they take the form of environmental goals - numeric commitments of emissions reduction and recycling percentages. Many companies measure their progress in publicly released environmental reports, or in environmental sections of their annual financial reports. More than half of the companies in our studies have some public environmental performance report. Most of these are aggregations of required public information like TRI, water effluent, air emissions etc. Occasionally financial data are included. However, they rarely indicate full integration of environment and sustainable development throughout a business , such as the AES values or Mr. Shapiro's statement would indicate.

Capital Investment

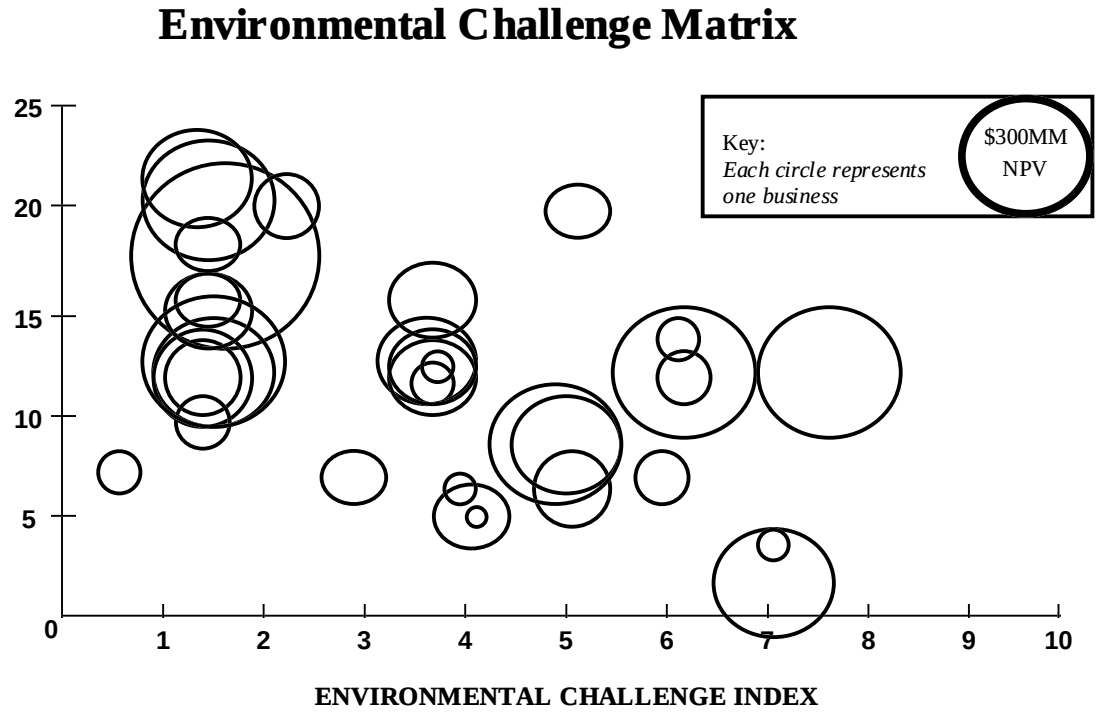
The most important set of decisions a company makes concern where it invests its capital. The sales and cash flow generated from capital investments - in new products, plant and equipment, land, and distribution systems - determine the future financial success of the company. Capital investment also determines the future environmental performance of a business. Resource use, pollution emissions, product durability and recyclability, community impact are all largely determined by the nature of the investments a company makes. Certainly, operational changes can improve performance, but step changes in performance occur with new investment. Hence, integration of environmental and social considerations into the capital investment process is critical for building a sustainable enterprise.

Most companies consider the environmental impact of new investment at some point in the decision-making process, but very few consider it in the idea formation stage. As an add-on, environmental considerations become a constraint in decision-making. When considered early and equally with other business considerations, environmental performance can become an opportunity.

A major appliance manufacturer recently invested in the re-design of its laundry manufacturing capacity. As they designed the fabrication and assembly lines, they took the opportunity to improve the ergonomics of workstations, and to nearly eliminate air emissions and hazardous waste. They chose technology based on environmental performance in addition to cost and reliability. For instance, they switched the tub and basket from a metal enamel to plastic. The injection molding process generates very little waste, in contrast to the enameling process. The end result has been a cleaner and safer workplace, and a lower cost product.

DuPont has a set of metrics and models which assist in the capital budgeting process, one of which is shown below. The matrix allows general managers to map the environmental burden of different products against their financial performance. This tool provides environmental and financial justification to divest of low margin businesses with high environmental impact. A sustainable enterprise would invest only in new businesses that are high margin and low environmental impact.

2) Strategic Investment



(SOURCE: DuPont)
Operations

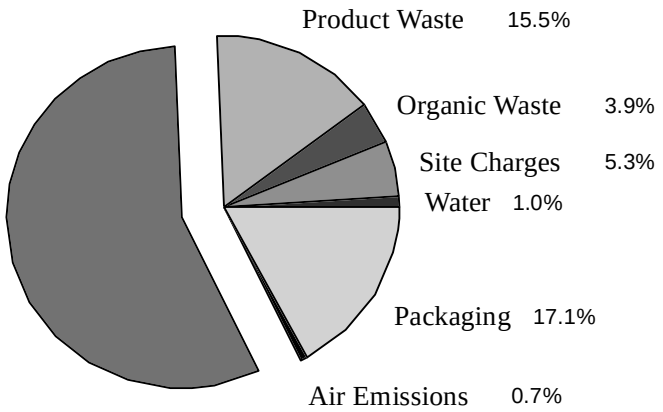
Operational focus on environmental performance has been the major area of environmental investment for most companies, and practices have become quite sophisticated. We have seen four essential activities that provide a basis for generating competitive advantage. First, companies that integrate environmental considerations into the design process, as a design parameter equal in important to cost, performance, reliability, quality, etc. have found opportunities to reduce environmental burden and improve business performance. In every industry we have studied, innovations have emerged which alter the competitive basis in a product category. Aqueous paints are better for the environment and often cost less. Electronics companies that have replaced CFC solvents with no-clean soldering have eliminated a raw material, and eliminated defects that occur in the cleaning process. Motorola estimates that it saves more than $20 million per year from no-clean.

Second, companies that gather data regarding environmental performance, both environmental data and financial data, have better information to make better decisions. Many companies have been gathering environmental data, and are getting more knowledgeable about how to make it useful. For instance, the ability to allocate environmental emissions to the products that produce them allows a product-specific assessment of environmental impact. On the financial side, the state of the art is more rudimentary. No company we have studied has a comprehensive cost accounting system for environmental costs. Many companies have cost data in some plants, or on a pilot basis. An example of how useful this data can be is illustrated in another DuPont tool below.

Waste is Cost

In one SBU, earnings = $150 mm

Of that:



$1 mm	*Air Emissions*
$8 mm	*Site Charges*
$6 mm	*Organic Waste*
$23.5 mm	*Product Waste*
$1.5 mm	*Water*
$26 mm	*Packaging*
$66 mm	***44% of earnings!***

This chart indicates that 44% of the earnings of one business unit were consumed by environmentally related costs. The general manager quickly assembled teams to focus on reducing packaging and product waste. The teams produced solutions that reduce the amount of wasted material, improved yield, and lowered costs.

Third, every company we studied had some kind of formalized environmental management system (EMS), including a policy, a management plan, and measurable performance indicators. The advent of ISO 14000 will assure that all companies have an EMS, and that they are roughly similar in design.

Organization and Culture

The most difficult thing to change in any organization is its culture. Yet, culture and values toward the environment must be changed in order for improvement to occur. We have seen three broad types of culture toward the environment. Culture is not homogeneous; we have seen all three cultures in a single company, varying across business units and functional areas. First is a rules based approach. This approach begins with the law, and assures compliance with it. Anything beyond the law is codified in internal rules or guidelines about operations and maintenance, and capital investment.

Second is a stewardship approach. Stewards see the environment as a social responsibility, and encourage their people to do the right thing. They view the environment as separate from the business, with discrete value and importance. Stewardship tends to emanate from individuals within the company, and is therefore reliant on their continued championship. Third is the competitive approach, which engages the environment as a business opportunity. Environment is integrated as one factor of demand on the company, among many others. This approach

seeks cost and market opportunities akin to those described in the business process discussion. Because of the integration process, this approach is more easily institutionalized than a stewardship approach, and is therefore less vulnerable to leadership changes. It also usually does better for the environment, because most outcomes are well beyond compliance.

Regardless of the approach a company takes to the environment, there are three areas where leading companies differentiate themselves in organizational development. First, environmental performance is an element of each employees overall performance objectives. They get paid and promoted based on how they as individuals, and how their business unit performs on environmental metrics. The performance plan is a powerful tool for aligning large organizations on a single objective. During the CFC phase-out, most companies in the electronics industry made CFC elimination a priority for their manufacturing management. The industry cost-effectively eliminated CFCs well in advance of objectives.

Second, companies aggressively engaged in environmental integration invest in learning - cross-functional teamwork, training, best-practices exchange, and job rotation. Motorola has design environmental awareness training for every single employee; they have internet-based design for environment training for process engineers and product designers; they have a two day symposium for management -level employees on environment and competitiveness. General Electric places all incoming engineers in environment, health and safety jobs for at least six months during their first two years on the job. Many companies place environmental professionals in operations departments, or place business professionals - marketing, engineering - in environmental departments. The activities are plentiful and varied. The goal is the same: build learning about the integration of environment and business throughout the organization.

Finally, and perhaps most importantly, environmental leadership comes back to individuals. In every success story of environment and business performance, there is a team or an individual who conceived and implemented the project. These people tend to share similar qualities. They are independent of mind. They are thoughtful. They are competent. Perhaps the greatest challenge for a company that seeks sustainability is the human resource challenge. Where do they find, recruit and train a workforce that thinks independent with a set of values that are widely held and which result in well executed operations?

V. Conclusions

We conclude this discussion with two observations in addition to those included at the beginning. The first is that leadership in environment and sustainable development is not different from leadership in any other field. Companies that are leading the technology development in their industries, that innovate in new product development, that pay attention to workplace issues like diversity and ethics, are the same companies that are taking a lead in sustainable development. Organizational factors such as leadership, culture, and autonomy distinguish companies which seek world class status in every category from those which are in business solely to generate financial return. In this regard the literature on leadership, values, and organizational design has an enormous amount to add to the managerial discussion of sustainable development.

The second observation is that transformation to sustainable development is inevitable. The momentum inside and outside industry is immense. The opportunities to develop new markets are proliferating. The social contract between the private sector and society is changing. Environmental and social enhancement from industry will no longer be a notable exception that distinguishes the strong from the weak. It will become a basis for competition, a minimum condition for success in any business.