

# THE Environmental Forum®

THE POLICY JOURNAL OF THE ENVIRONMENTAL LAW INSTITUTE®

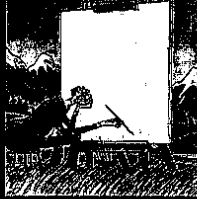
VOLUME 14, NUMBER 5

SEPTEMBER/OCTOBER 1997



## The Environmental Impact Of The Service Sector

SHOCKING NEWS ABOUT DEREGULATING ELECTRICITY  
CONFLICTING OPINIONS ON EXPANDING NAFTA



COVER  
STORIES

## An Incomplete Picture

*Though the services may not be at the end of the pipe, they have a significant effect on its size and contents. Yet we are only beginning to understand the environmental impacts — and opportunities — the sector presents*

DAVID REJESKI

**T**hink back for a moment to the 1950s. Industrial America was at its ascendant, and this country dominated the global economy. Levittowns sprouted across the countryside, with a Chevrolet in front of every home and a Frigidaire, Whirlpool, and Zenith inside. But during that decade a fundamental shift happened in our society: for the first time, more than half of all jobs were in the service sector rather than agriculture and manufacturing. Today, this transformation is complete. Services account for almost 80 percent of employment and more than 75 percent of gross domestic product.

But the nature of the service sector is widely misunderstood. Its mantra is not, "Do you want fries with that?" as the conventional wisdom would have it but, instead, "Do you want to download that off our web site or should we FedEx you our CD-ROM?" Forget any preconceptions you have about services as a backwater of low-skilled, low-paying jobs. The service sector is built on intellect. In fact, almost 80 percent of all information technology is bought and used by the service sector. Services lead the way in organizational and managerial innovation, with networking, virtual offices, and the flattest and most streamlined organizations. Pittsburgh, probably the ultimate metaphor for smokestack America, is now a center of high tech.

The service sector has redefined the way goods are sold, from the warehouse megastore to fast foods, ATMs, overnight mail, and catalog and Internet shopping. Its logistics and procurement system rivals that of the military. In many cases we are seeing an interchangeability of services for manufacturing and a move by manufacturers to provide functional equivalents to products — copies instead of copy machines, clean parts rather than solvents. Industrial giants like Mon-

santo talk about transforming their company to sell healthy crops, a service, rather than pesticides, a product.

Does any of this matter to the environment and environmental policy? Frankly, we really do not know. The environmental impact of heavy manufacturing is relatively easy to permit and regulate. Though less centralized, agricultural impacts can be assessed in straightforward, obvious ways. But what about the service companies that use manufactured and agricultural products downstream? What about the service companies based on new commodities like information, which use energy to air condition offices and run truck fleets, and whose units of production include computers and photocopiers, and whose supply streams include circuit boards and paper?

Current environmental law may work well to regulate the service sector — or maybe not. What is especially unsettling is that virtually no one in the environmental policy community seems the least bit curious. Of the many think tank exercises undertaken over the past few years to explore the future of environmental policy, only one, the Next Generation Project at Yale, has paid any attention to the most fundamental transformation of the U.S. and global economy to occur since the Industrial Revolution. Compare this to the thousands of studies and dozens of policy initiatives per year focused on the manufacturing sector. Ironically, rather than address the diverse and less tangible environmental impacts of this change, many policy makers point to the transition to a service economy as an automatic environmental benefit, presaging a reduction in pollution as industry moves away from smokestack activities.

This oversight would not matter much if the manufacturing model of the world was applicable to the service economy, but it is not. Or if the environmental policies de-

signed to influence manufacturers made sense when applied to services, but they often do not. As James Brian Quinn, an expert on the service sector at Dartmouth, has commented, "Those who fail to understand the realities and potentials of services are very likely to mismanage their own enterprises. They will certainly support some poor national policy choices." Our enduring obsession with Industrial American may be blinding us to a new set of opportunities to improve environmental quality. By ignoring the service sector, our understanding of the structural drivers and levers impacting environmental quality is fundamentally flawed. Though the services may not be at the end of the pipe, they have a significant impact on its size and contents.

**F**or five decades now, services have been the foundation of the American economy, with only one quarter when the sector has not grown. And the sector is large. The *Economist* once defined services as "anything sold in trade that cannot be dropped on your foot." This includes wholesale and retail trade, communications, advertising, health care, entertainment, finance, hospitality, insurance, real estate, and legal services. The financial sector alone is equal in size to all of U.S. manufacturing. A handful of large retail chains like Wal-Mart, K-Mart, and Target account for one out of every ten dollars of national retail sales. In terms of annual revenues, service providers are often much larger — by orders of magnitude — than the product companies that supply them. Toys "R" Us is almost twice the size of two of its largest suppliers combined (Mattel and Hasbro), Wal-Mart is ten times larger than Levi Strauss, and United Airlines is three times the size of the commercial aircraft division of McDonnell-Douglas. United Parcel Service is the largest single customer of Boeing. This translates into enormous power in the market place and an unprecedented reach into the minds and pockets of consumers.

There are three reasons the service sector deserves more attention. First, the environmental problems (and opportunities) of the service sector are poorly understood, and woefully under recognized. For instance, FedEx has a total fleet of 451 airplanes and more than 30,000 vehicles and on a typical day moves more than 1 million packages through its hub in Memphis. UPS handles 5

to 7 percent of the economy's total value (in gross domestic product) every day, picking up 12 million packages with another 12 million in transit. The time demands placed on logistics and delivery systems by customer expectations and just-in-time inventory practices can significantly increase energy use. Moving a package with an airplane uses 5-7 times as much energy as by truck and more than 40 times as much as by rail. A study done at UCLA for Patagonia, a high-end outdoor mail order and retail clothing and equipment supplier, found that if the company used overnight mail, transportation accounted for a much larger part of the total energy needed to create and deliver a garment, rising from 6 percent to 28 percent.

We have virtually no understanding of the complex set of energy and environmental tradeoffs directly tied to distribution and transportation systems, systems which are often being reconfigured on an hour-by-hour or minute-by-minute basis. We may only react when problems become obvious, as they did in Japan where the move to just-in-time caused traffic in both urban and rural areas to worsen to the point where the government mounted a major campaign encouraging companies to reduce deliveries.

What if you run a phone company? NYNEX has to deal with the environmental problems of 2,100 buildings, a fleet of more than 18,000 vehicles (including batteries and other hazardous materials), sediment in 113,000 manholes, and more than a thousand underground storage tanks. It faces the interesting challenge of finding more cost effective and environmentally benign preservatives for 2.5 million utility poles (there are 170 million in the country). There are also a variety of environmental opportunities to be found in their massive operations. Simply printing their phone bills double-sided reduced paper use by 25 percent and saved more than \$4 million per year.

Consider the health care sector — a complex and interlinked network of 180,000 physicians offices, 98,400 dentists offices, 15,500 medical clinics, 12,700 extended care facilities, 4,300 laboratories, and 6,000 hospitals. Operating 24 hours a day, 7 days a week, hospitals are one of the most energy-intensive of the service sectors. They are small cities — combining the functions of a hotel, restaurant, warehouse, offices, and maintenance facilities and operated by staffs in the thousands working in disparate professional cultures. They account for a total of 158 mil-

David Rejeski is a policy adviser in EPA's Office of Policy, Planning, and Evaluation. At present, he is an agency representative at the Council on Environmental Quality, where he serves as the executive director of the Environmental Technology Task Force.



lion tons of municipal solid waste annually and also have complex waste streams, typically including 10-15 percent biohazards and approximately 5 percent hazardous waste. Because of the complex nature of the waste, the yearly disposal costs for a medium-sized hospital can reach \$350,000 (more than \$1 million for a teaching hospital).

As one moves outside of the hospitals into the large and extended health care network, our understanding of, and control over, environmental issues lessens dramatically. When high levels of silver began showing up in the sediment and tissues of marine animals in San Francisco Bay, the California EPA undertook a study which showed that more than 25 percent of all silver flows in the U.S. economy, an amazing 1,000 tons per year, were attributable not to industry but to dentists offices. The silver was being washed down the drain after the development of radiographic films. Though technically feasible, it is often uneconomical and impractical for such small generators to recycle this silver under existing regulations. The result is larger ecological impacts from silver mining, detrimental effects on the operation of sewage treatment plants, and increased risks for marine animals.

And do not overlook the real estate sector, one of the largest industries in the nation, accounting for more than 12 percent of GDP. Decisions made on a daily basis by scores of developers impact land use, as well as biodiversity, transportation-related air emissions, indoor air quality, and stormwater runoff. Today's development patterns are chewing up the landscape at a prodigious rate. In the first five years of the 1990s, the greater Atlanta metropolitan region grew 35 miles along its north-south axis. The Los Angeles metropolitan area now encompasses more than 5,000 square miles, an area the size of Connecticut. Are there options? Advocates

for smart growth and members of the new urbanists movement would argue that more environmentally benign development is possible. In 1995, a group of 25 golf, environmental, and government representatives developed a set of environmental principles dealing with the planning and siting, design, construction, maintenance, and operation of golf courses and focused on reducing impacts on groundwater, ecosystems, biodiversity, and pesticide and herbicide use.

We could expand this list to include restaurants, universities, hotels and motels, mail order shopping, and retailing — all presenting complex sets of environmental issues and linkages to the manufacturing and agricultural sectors of our economy. But the basic question remains: Just how well do we understand these linkages and the environmental impacts and opportunities for improvement?

**T**he second reason the service sector deserves more attention is its upstream leverage. McDonalds, for instance, in feeding 20-30 million people daily, requires 2 million pounds of potatoes every 24 hours. Because the size of many service companies far outstrips that of their suppliers, they have significant power over their supply chains. They can create an environmental market where none exists or pass customer signals concerning environmental preferences back to manufacturers. More and more service firms are taking

control of their supply chain to meet both customer demands and corporate commitments to environmental excellence. Business for Social Responsibility found that the primary factors motivating companies to undertake environmental management initiatives in the supply chain include acting consistently with internal corporate values, responding to customer interest, and capturing economic benefits.

*The service sector is widely misunderstood. Its mantra is not, "Do you want fries with that?" but, instead, "Do you want to download that off our web site or should we FedEx you our CD-ROM?"*

One of the most powerful of these organizations visits your house almost every day — the U.S. Postal Service. Last year, the Postal Service spent more than \$160 million to purchase products with recycled content. When USPS specified 25 percent recycled content for its packaging, Dupont responded. Rather than lose a large customer, the \$42-billion chemical giant invested R&D funds to develop a way to manufacture the high-density polyethylene wrappers for express mail packages from old milk bottles instead of virgin material and meet the Postal Service's requirements.

Keep your eyes on Kinko's, which uses 36,000 tons of white paper per year and is one of the largest buyers of Xerox copiers. As one executive at a large paper company said, "Kinko's is such a large customer, their environmental concerns are difficult to ignore." In January, the company consolidated its 129 affiliated joint ventures and is now pursuing a comprehensive environmental strategy focused on waste management, eco-purchasing, and energy efficiency.

**A**t the beginning of 1994 hundreds of America's leading chefs gathered in more than a dozen cities across the U.S. for a series of formal signings of the "Chefs' Collaborative 2000: Charter and Statement of Principles." The collaborative was a response by the participating chefs to a decline in the quality of our soil and water, increasing pesticide use, and high rates of diet-related chronic disease. They agreed to leverage their purchasing power to create a greater demand for organically produced products from local farms and to educate their customers concerning sustainable food choices. They have also been working to increase the demand for seafood products from aquaculture systems.

Volume buying of ecologically sound

goods can play an important role in getting costs to competitive levels or helping markets grow. Patagonia has helped keep the demand for organically grown cotton alive by purchasing more than 15 percent of the U.S. total production for the past two years. The Postal Service has had a major impact on the demand for re-refined oil by encouraging its use in its fleet of more than 208,000 vehicles; more than 100,000 presently use re-refined, accounting for \$800,000 in purchases in 1996.

The Postal Service also cut the per unit costs of energy-saving LED exit lights almost in half by committing to purchase 15,000 units, a change which will save it more than \$300,000 per year in energy and maintenance costs and eliminate 3,000 tons of carbon dioxide emissions. NYNEX now makes the return envelopes for phone bills — 14 million per month — from 100-percent recycled paper, including 50-75 percent old telephone books.

This type of demand leveraging can be extended even further through the formation of "buyers clubs." The newly formed Forest Product Buyers Club includes organizations such as Home Depot and Habitat for Humanity (the largest home builder in the world) and is designed to increase the demand for wood products from forests managed on a sustainable basis. As we move into a deregulated energy market, similar groups could get together to increase the purchase of electricity from renewable energy providers.

Finally, one should not overlook government itself. The federal government purchases approximately 2 percent of all things sold, state and local government purchases an additional 5 percent. One good example is paper: the federal government uses 10 million sheets per hour during the work week. Executive Order 12873, signed in 1993, had a major impact in increasing the demand for recycled content paper, not only through the

*Many services  
have  
environmental  
problems which  
overlap with  
manufacturing  
and agriculture.  
Just how well  
do we  
understand their  
impacts and  
opportunities  
for  
improvement?*

power of government purchases but the ability of the government to set a standard on recycled content, which then become widely adopted at both a state and local level and by the private sector. Within the federal government, the Department of Defense accounts for an amazing 67 percent of all procurement activity (1995 figures), with the Department of Energy and NASA making up an additional 15 percent. Procurement policies by DoD on paper, re-refined oil, retread tires, and other remanufactured parts can have major market impacts.

The upstream impact of the service sector is one of the most underutilized levers available to environmental policy makers. In many cases, service companies themselves have yet to fully realize the power they can wield over environmental decisions in the manufacturing and agricultural sectors. A growing commitment to environmental concerns in service companies, coupled with supply chain information and management strategies, could yield significant environmental bonuses.

**T**he third reason the service sector deserves more attention is its downstream links to consumers. The service sector will likely pick up on the environmental concerns of the customer first. In fact, services are built on anticipating and, in many cases, shaping customer preferences. Taco Bell does 800,000 exit interviews per year to study customer attitudes and preferences. In the retail sector, transaction-based information systems track every purchase made by customers, often matching purchasing preferences with socioeconomic data, and passing sales information upstream from retail outlets to manufacturing facilities and their respective suppliers.

Daily interactions with large numbers of

customers create unparalleled opportunities to read the tea leaves of consumer attitudes and to educate individuals regarding the environmental impacts of their behavior and the implications of product choices. Service providers and retailers are in a strategic position to challenge the environmental perceptions held by customers. Just consider the reach of the phone company, mail order shopping, fast foods, or the hospitality sector.

A medium-sized hotel with 150 rooms might expect 100,000 guests per year, and 100 hotels that size could reach 10 million people in a single year. Small changes get noticed. The Saunders Hotel group, which runs the Copley Square and Lenox hotels in Boston, developed a pump dispenser for all bathroom amenities and eliminated the cost of a quarter million single-use plastic containers per year at one hotel. This is one piece of an ambitious environmental program at the hotels that includes energy and water conservation, hazardous material elimination, and an extensive education and outreach campaign for both guests and employees. Surveys have shown that more than \$1.5 million in new business is attributable to the program's recognition.

Increasingly, mail order retailers like Patagonia and L.L. Bean are using their catalogues to inform potential customers about environmental issues or conservation programs they support. One of the largest environmental magazines, *Audubon*, has a circulation of 4.5 million. In a typical year,

L.L. Bean sends out more than 115 million catalogues. Even a relatively small company like Patagonia will reach more people yearly with its 600,000 to 750,000 catalogues than the Sierra Club with its *Bulletin* (circulation: 516,000).

The Busch Entertainment Corporation, with ten theme parks and 15,000 employees, attracts more than 20 million people per year to its facilities, including Sea World and

*The upstream impact of the sector is one of the most underutilized policy levers. Companies themselves have yet to realize their power over environmental decisions in manufacturing and agriculture.*

Busch Gardens. They are beginning to think about how some of their environmental success stories can be used for educational purposes, including innovative work being done on water management (micro irrigation techniques), pollution prevention, bio-fuels, and composting (3,800 tons per year in one park).

We need to keep in mind that few manufacturers sell directly to customers. The main interface is through the retail sector — a service. In the future, one of the most important environmental frontiers may be at the point of purchase, whether it is a mail order catalogue, Internet home-page, or retail outlet.

**E**ven if policy makers woke up to the service sector, we would be a long way from knowing what to do. We are left with a wide array of tantalizing anecdotes, but no comprehensive body of research. A few studies which have attempted to find a so-called service bonus — an environmental improvement tied to a shift to a service economy — have found no conclusive evidence that such a benefit exists.

But at an intuitive level, most people can grasp the issues and opportunities presented by the services. Even if the sector produces less pollution than traditional manufacturing, it is still worth our attention because of the enormous leveraging and educational possibilities, as well as unexplored links to the production and manufacturing sectors. For those policy makers interested in putting some substance behind their jobs-and-the-environment rhetoric, it is important to understand that the service sector will be responsible for all net job creation through 2005.

Because this sector has not been highly regulated, there may be more room, and willingness, to experiment. It may be possible to achieve high levels of environmental quality

without a lessening of service quality. In the long run, the service sector may provide the frontier many policy makers are seeking to try out non-regulatory approaches to environmental management which are largely information-based and information-driven. But this may not happen, or happen only slowly, if we turn our heads.

For the manufacturing sector, the government provides an unending stream of programs, incentives, and public relations perks to companies and CEOs engaged in good environmental management practices. Just two manufacturing sector programs of the federal government, the Common Sense Initiative at EPA and Industries of the Future at the Department of Energy, provide combined funding of almost \$100 million. We give awards, build information clearing houses, fund research, support technology development, hold conferences, and continually try to understand how and why various incentives work or fail. Virtually anything we did for the service sector would be more than we are doing now and many of the options would be low-cost with large impacts. Here are a number of areas where government involvement could make a difference:

*Develop a better understanding of the impact of regulations on the sector.* Services share some of the same issues concerning regulations with the manufacturing world. They must often deal with inconsistent regulatory and reporting requirements between the federal govern-

ment and the states. For instance, 42 states have different definitions for what constitutes medical waste. An I.V. bag defined as solid waste in Vermont becomes a biohazard in many other states (increasing disposal costs by a factor of 10). Many services fall under multiple regulatory jurisdictions. In addition to EPA and OSHA, hospitals have to deal with the Food and Drug Administration and the Nuclear Regulatory Commission.

*As to downstream leverage, the service sector will likely pick up on the environmental concerns of the customer first. Services are built on anticipating, and shaping, customer preferences.*

However, fundamental differences between the service and manufacturing sectors give rise to other inconsistencies in regulatory application. For instance, many regulations for the manufacturing sector assume continuous or near continuous emissions or generation of wastes. Some service industries are seasonal, with virtually all generation taking place during a one-month period (for instance, during the annual start-up of theme parks). Because of the "potential to emit" clause in the 1990 Clean Air Act Amendments, many phone companies have to get hundreds of permits or ask for hundreds of exemptions annually to operate their emergency standby generators 8 hours per month (AT&T has 5,000 such units). Traditional regulations work best in a system where problems and work environments remain stationary and stable. The service sector is diffuse and undergoing continual restructuring. Potential environmental problems may be at sites that are unmanned, mobile, or are far removed from centralized environmental health and safety expertise.

As home health care expands, for instance, environmental issues which were dealt with in the hospital can move into thousands of homes across the nation. More than one billion syringes a year are now used in the home and only a few states have disposal or pick-up programs. The general trend of outsourcing to low-bid vendors with little environmental expertise or concern will continually exacerbate this problem across a wide array of service sectors.

More systemic approaches are needed for exploring the application of one-size-fits-all regulations in a service-based economy, approaches which encourage harmonization and streamlining and avoid the problem of juridification — the proliferation of another layer of regulations and laws to deal with service industries. For instance, the Depart-

ment of Toxic Substance Control in California has set up the Laboratory Regulatory Reform Taskforce to examine the "fit" of industrial waste regulations to clinical laboratories. For legal scholars, services may provide an interesting test case for reflexive law, which stresses responsiveness to changing industrial structures and the enlisting of a wide range of institutions in the task of environmental protection. However, we should not forget that the services, because of their size and leveraging potential, offer a wide range of non-regulatory options, some of which can be supported with strategies outlined below.

*Support and help diffuse best practices.* At the moment, there is little communications across service sectors. Some industries, like real estate, are highly entrepreneurial, with little motivation for sharing among players. However, many service companies will share information and could benefit from knowing about the efforts of others, including work on environmental management and technology applications. For instance, best practices on water conservation and waste water treatment could be shared among parks, theme parks, golf courses, and the real estate sector. Recycling is a critical issue for hotels, universities, restaurants, and entertainment facilities. Interest in sustainable production practices (both forestry and agriculture) crosses over the restaurant, home building, retail clothing, and mail order sectors.

To date, many of the initiatives to support information on best practices have been

developed on a shoestring by the service industry itself. For instance, the American Hotel Foundation developed a video showing best environmental practices in a number of hotels. The four-year old HealthCare Resource Conservation Coalition supports technology transfer aimed at resource recovery and waste reduction between hospitals and their suppliers. Busch Entertainment set up a simple system on Lotus Notes connecting all

*Traditional regulation works best in a system where problems and work environments remain stationary and stable. The service sector is diffuse and undergoing continual restructuring.*



the company's theme parks; it contains more than 100 approaches to issues such as energy and water conservation and recycling. It would be relatively inexpensive for the government (possibly working with trade associations) to help spread the word on environmental best practices across service sectors. There is also a special need to transfer technology and information among large companies, which often have the resources and expertise to support cutting edge environmental management practices, and small and medium firms facing financial and human resource constraints.

*Fund data collection and applied research.* The service sector is composed of diffuse industries lacking a research infrastructure. Unlike their manufacturing brethren, few service companies have large engineering staffs, R&D budgets, or funds for technology assessment. Yet the environmental issues they deal with on a daily basis can be enormously complex. When Home Depot became interested in examining the environmental impacts of pressure treated wood, the company quickly became tangled in the complex life cycle of chemicals like chromium, arsenic, and copper — a trail of impacts that stretched from the minehead to the landfill. For those service companies interested in looking holistically at the impacts of their activities, the data on life cycle impacts for upstream production processes are often missing. Much of this data would be too expensive to be collected by a single company or even a collection of companies, but would find wide use if available (for instance, building blocks for life cycle analysis in areas like petroleum and natural gas; metals like iron, steel, copper, nickel, chrome, zinc, aluminum; paper products, etc.).

Though many companies want to meet their goals of environmental and social responsibility in the most cost-effective way possible, they often lacked the information, the capacity to generate it, and the ability to

validate it. As one environmental manager told me, "What do you do if you have the will and initiative but zero budget?"

This lack of significant internal research, engineering, and analytical capacity makes the service companies highly dependent on third-party certification and verification programs. A continual and difficult issue for those wishing to purchase environmentally (and pass that information onto consumers) is being able to certify the accuracy

of supplier claims concerning the impacts of their production processes. Patagonia found that very little certified organic cotton was being grown in the United States. For many service companies, finding and certifying the certifiers can be as difficult as validating the environmental claims of suppliers.

At a more general level we lack baseline information on the environmental performance of various service sectors and a consistent set of metrics applicable to the diverse companies which make up services. How exactly would we measure environmental performance in these industries — on a per guest or patient basis, per sale, per shipment, etc.? Without such baseline data, it is impossible to develop performance benchmarks and track progress of the service companies themselves or their suppliers. For companies with scarce resources for environmental improvements, a lack of data and applicable accounting frameworks also makes it

exceedingly difficult to prioritize strategies and actions.

*Integrate the services into environmental policy analysis and development.* One of the most important lessons from systems theory is that when we artificially bound a problem, we run the risk of overlooking linkages, levers, and impacts that fall outside the boundaries. The artificial boundary we have drawn between manufacturing and services continues to de-

*The service sector is composed of diffuse industries lacking a research infrastructure. Yet the environmental issues they deal with on a daily basis can be enormously complex.*

fine the battle lines and rhetorical salvos between government, industry, and environmental groups.

What is needed is a view which integrates the economy — the manufacturing, agricultural, and service sectors — and stretches from the wellhead, mine, or farm to the point of purchase and beyond. This leads us to new models of problem solving and collaboration that reflect our whole economy, not just 15 percent. It would help reshape the policy dialogue and provide a new impetus for change at a time when the system is viewed by many in government, industry, and the public interest community as increasingly gridlocked and inflexible.

**W**e need to look over the horizon at the further structural transformation of our economy. What about environmental policy in a world where we will likely see a redefinition of retailing, the increasing interchangeability of services for products, and the substitution of information for energy and materials? What happens if retailing goes away, or merges with production? Over the next ten years, consumer-direct distribution is estimated to grow to an \$85-billion business. Here customers place Internet-based orders which are delivered directly to the home, completely bypassing the retail outlet. Another option, which is becoming technically feasible, is to move production into the shopping mall. This would require agile small-footprint, zero-emissions manufacturing systems enabling the rapid production of goods like shirts, shoes, etc., to customer specifications (what some term lot-size-of-one manufacturing). Though this may sound far-fetched, ten years ago we would not have imagined a full service photo laboratory (using a wide vari-

ety of chemicals and processes) sitting between the Gap and Foot Locker.

What are the long term environmental implications of manufacturers' leasing function rather than selling product? Interface, the world's largest producer of commercial floor coverings, has found a simpler way to provide the service of a carpet using just one-fifth the product — by leasing rather than selling. The company offers to maintain the carpet indefinitely, periodically replacing the twenty percent or so of the tiles that wear out most frequently. The old tiles are ground into a powder and recycled into new product, allowing Interface to maintain the carpet as an owned asset rather than have it discarded as an environmental burden.

Our greatest challenge may be stimulating a greater substitution of information for materials and energy. It takes about 1.5 kilowatts and an hour to drive across Manhattan. We can move information instantly from Manhattan to San Francisco with one-hundredth the energy. This might be the ultimate service bonus, if it happens. But we will need to carefully and continually examine the energy and materials implications behind the emerging technologies for information sharing, transportation, materials handling, storage, and distribution.

A recent law journal carried an article about the "Ten Paradoxes of Environmental Law." The first paradox was simple: things change. Many of these changes are slow enough so we can respond effectively — if we see them, if we can understand them, and if our existing system

of institutions, laws, and policies have the inherent flexibility to adapt. Certainly, that is not asking too much of government, to be both respectful of history but aware of the future. If we can lift our heads for a moment, we may find an opportunity to reexamine the most fundamental links between the economy and the environment and reshape the often contentious and unproductive dialogue on the future of environmental policy. •

*What is needed is a view which integrates the economy — the manufacturing, agricultural, and service sectors — and stretches from the wellhead, mine, or farm to the point of purchase and beyond.*