Recycling
...for the future

Consider the benefits

Recycling is everybody's business. From industry to government, from schools to our very own households, America's commitment to recycling has helped keep our communities clean and our economy strong. Federal agencies are further reducing waste generation, increasing recycling, and increasing purchases of recycled products.

Working together, there is even more we can do. Today, we challenge every American to step forward, take action, and contribute to this important national effort. By bringing new partners to the recycling efforts of businesses and families across the nation, we will better protect our natural resources, improve our quality of life, and strengthen our economy.

— White House Task Force
on Recycling

Recycling...for the future

Consider the benefits

This is the first in a series of documents about the state of recycling in America published by the White House Task Force on Greening the Government Through Waste Prevention and Recycling (Task Force on Recycling).

November 1998

recycling for the future

CONSIDER THE BENEFITS

Recycling is one of the best environmental success stories of the late 20th century. Today, curbside recycling collection programs reach the majority of the American population. In fact, more people recycle household waste than vote in elections. This nationwide, grassroots effort creates an immense flow of materials. Recycling, including composting, diverted 57 million tons of material away from landfills and incinerators in 1996, up from 34 million tons in 1990—a 67 percent increase in just 6 years. In 2005, the diversion rate resulting from recycling and composting is projected to reach 83 million tons, or 35 percent of all solid waste.

To understand how large this amount is, imagine recycling boxes 3 feet long (9 cubic feet) filled with recovered materials stacked end to end, forming a bridge from the earth to the moon. In 1996, these boxes would reach three-quarters of the way to the moon. When we achieve our 2005 recycling goal of 35 percent, the boxes of recyclables will reach the moon.

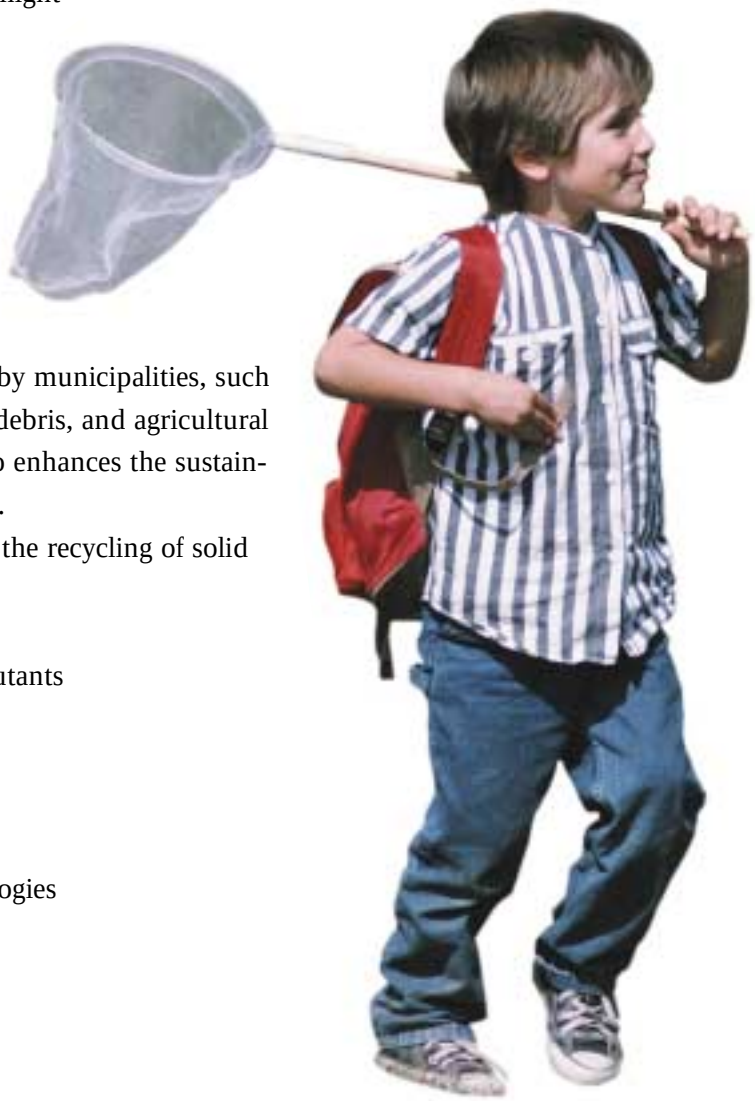
Is recycling worth all the effort? Is profitability the only bottom line? Some observers suggest that current profitability is the only measure of success. This perspective focuses solely on how an individual recycling program impacts a community's total waste management costs, compared to the alternative of sending everything to a landfill or incinerator. Other observers suggest a broader view of the costs and benefits of recycling.

Although experience differs from one recycling program to another, the most successful programs, including many with the highest diversion rates, are cost-effective and, indeed, profitable. Inevitably, markets for collected recyclables go up and down. To somewhat insulate recycling programs from severe market swings, the efficiency of recycling

It is important to recognize the many economic and environmental benefits recycling already achieves.

programs must continually be improved. One of the goals for the recycling community in the next decade must be to identify and replicate the factors that determine success.

While efforts to learn from and adopt the methods used by the most efficient programs are ongoing throughout the country, it is important to recognize the many economic and environmental benefits recycling already achieves. Many of these benefits either might not be apparent to casual observers, might be clouded by municipal accounting and taxing peculiarities, or might not be reflected in the market prices of contracts between cities and recyclers. The full energy savings from recycling used beverage containers, for example, is not included in the prices negotiated in a curbside recycling contract.



The benefits from solid waste recycling also apply to waste streams other than those managed by municipalities, such as industrial wastes, construction and demolition debris, and agricultural wastes. Recycling materials from these sources also enhances the sustainability of the planet and the future of our children.

At least eight categories of benefits result from the recycling of solid waste. Recycling:

- Reduces the need for new landfills
- Prevents emissions of many air and water pollutants
- Saves energy
- Supplies valuable raw materials to industry
- Creates jobs
- Reduces greenhouse gas emissions
- Stimulates the development of greener technologies
- Conserves resources for our children's future

Recycling has been one of the growth industries of the 1970s, 1980s, and 1990s. Recycling is not a fad. By 1996, more than 7,000 curbside collection programs served roughly half of the American population. In that year, recycling, including composting, diverted 27 percent, more than a quarter of the nation's solid waste.

But recycling isn't new; it's as old as recorded history. Before the days of mass production, households routinely repaired, reused, and recycled their material possessions as a matter of economic necessity. Then as now, key industries rely on recycling. Rags, for example, provided the principal source of fiber for the paper industry until the late 19th century. Corrugated boxes have long been collected by retailers for recycling back into shipping containers. Scrap yards have always efficiently recycled old automobiles, automotive parts, and other metal goods.

World Wars I and II brought brief surges in recycling as scrap drives collected paper, metals, and other materials for the war efforts. After the war, scrap drives declined, and by the late 1960s, the overall levels of recycling and participation by individual households in the United States hit rock-bottom. Traditional forms of recycling also diminished with the explosive growth in America's economy throughout most of the 20th century. Rising incomes and the spread of affordable mass-produced goods have allowed a life of growing material abundance. With this abundance came an increasing tendency to discard and replace products after their initial use, rather than to reuse or recycle them.

The surge in environmental activism and awareness that began in the early 1970s led to a new wave of interest in recycling. As many as 3,000 volunteer recycling centers opened in the years following the first Earth Day in 1970. More than 100 curbside collection programs were set up in the early 1970s, many of them concentrating on a few materials such as newspapers and cans. Interest in recycling and volunteer programs continued to expand. The U.S. Environmental Protection Agency (EPA) and some state agencies developed guidelines, technical assistance, and targets for local efforts. Although waste generation grew by 25 percent in the 1970s, recycling grew by more than 45 percent.

a brief history of recycling

In the 1980s landfill shortages began to occur, particularly in densely populated areas of the country, leading to garbage being transported long distances, frequently across state lines. Waste management firms began to offer recycling programs, often in connection with proposals for new incinerators or landfills. Community groups often called for even more ambitious recycling efforts, in the hopes of limiting or avoiding new disposal facilities. State and local governments played an increasingly active role in planning for waste management, including an expanded role for recycling and composting. The combined effects of landfill shortages, resistance to accepting out-of-state garbage, and growing national attention to the issue prompted EPA to publish national policy guidance—the 1989 *Agenda for Action* called for Americans to achieve a 25 percent recycling rate. By this time, there were about 1,000 curbside collection programs as well as countless drop-off, workplace, and other recycling efforts. While waste generation again grew rapidly in the 1980s, increasing by nearly 36 percent, recycling and composting shot up by nearly 132 percent during the decade, to 16 percent of total waste generation.

Increased collection of recyclables initially created a greater supply of recovered materials than could be readily utilized by U.S. manufacturing companies. By the mid-1990s, however, industry was making multimillion dollar investments in processing and manufacturing technologies specifically designed to use recovered materials instead of virgin raw materials to produce a broad range of products. Consumers have become increasingly aware of the important role they play when buying products made from the same materials they collect for recycling. Government agencies at all levels have worked to ensure recycling's viability by increasing government purchases of recycled-content products. From 1990 to 1997, recycling continued to achieve double-digit growth, increasing to a total of 27 percent of solid waste generation—a growth of nearly 67 percent over the 1990 recycling rate, surpassing the national policy goal of 25 percent.

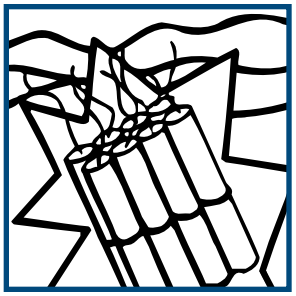
The national trends in recycling are reflected in the experience of many cities and towns. To pick just one example, Ann Arbor, Michigan, was among the communities where volunteers opened a drop-off station in 1970. A few years later, a volunteer group called Recycle Ann Arbor began curbside recycling collection. Today, Ann Arbor's municipal government offers its residents weekly collection of 23 types of recyclables and seasonal collection of four types of yard debris. These efforts, combined with widespread home composting, drop-off recycling, and the effects of Michigan's bottle bill, allow Ann Arbor to divert 52 percent of its waste. Recycle Ann Arbor bids competitively for, and consistently wins, the city contract to provide recycling services.

The high volume of diversion helps hold down the costs. In 1996, for example, Ann Arbor spent $71 per ton on recycling and composting, compared to $86 per ton for trash collection and disposal.

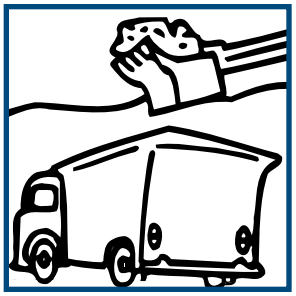
Communities such as Ann Arbor, which have achieved high diversion at low cost, provide useful models in the effort to improve the cost-effectiveness of local recycling programs throughout the country.

the life of a steel can

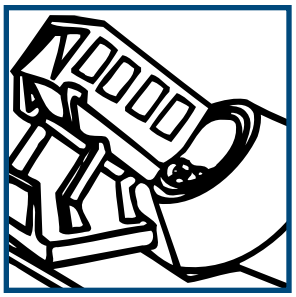
EXPLORATION
Iron ore, limestone, and coal are discovered by blasting huge holes in the earth's surface, with associated impacts on lands and biodiversity.



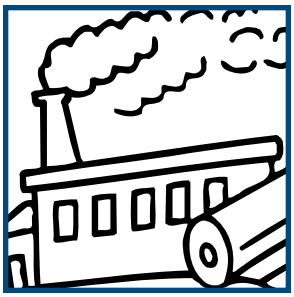
EXTRACTION AND PROCESSING
Raw materials are extracted from the earth, possibly displacing plant and animal habitats and polluting the air and nearby water sources. The extracted materials are then processed to remove impurities.



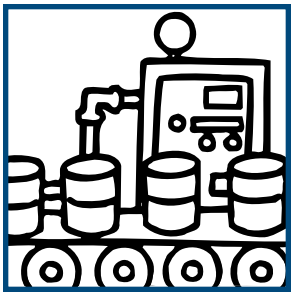
COKE MAKING
Coal is converted into coke, creating potentially hazardous air pollutants and carcinogenic substances which might be emitted. Then, coke is combined with limestone and iron ore in huge blast furnaces that create molten "pig" iron.



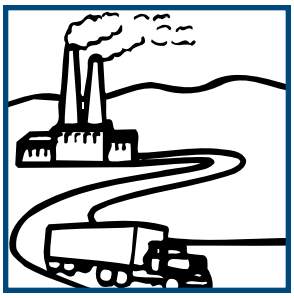
MANUFACTURING
Molten steel is poured into molds, then converted into steel coils.



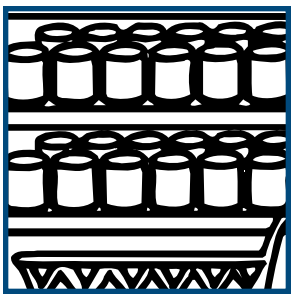
FABRICATION
Steel coils are converted into cans of various sizes.



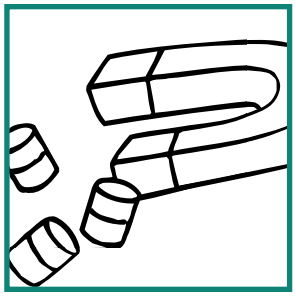
DISTRIBUTION
Cans are distributed to product manufacturers, who fill them with a range of products from paint to peaches.



USE
Products in steel cans are purchased and used.

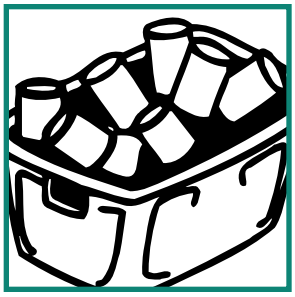


LANDFILLING
After being used, some steel cans are discarded...



PROCESSING

Steel cans are separated from aluminum cans, cleaned to remove labels and food residuals, then crushed, baled, and sent to a mill to be melted down and made into new steel cans. No exploration, extraction, or coke making occurs.



RECOVERY

…while others are recovered for recycling.

THE BENEFITS OF RECYCLING STEEL

The recycling of steel food containers and packaging between 1990 and 1996 resulted in:

- Savings of almost 19 million British thermal units (Btus) of energy.
- Reduction of greenhouse gas emissions by almost 600 thousand metric tons of carbon equivalent.
- Production of valuable materials worth $57 million.
- Savings of almost 3 million cubic yards of landfill space.

Overall steel recycling from all sources (e.g., old cans and bridges) in the United States was nearly 72 million tons with a total economic value of almost $6.8 billion.

recycling…

THE BENEFITS

Recovering and reusing materials results in substantial environmental and societal benefits. The following sections detail how recycling reduces the need for new landfills, prevents pollution, saves energy, supplies valuable raw materials to industry, creates jobs, reduces greenhouse gas emissions, stimulates development of greener technologies, and conserves resources for our children's future.

RECYCLING REDUCES THE NEED FOR NEW LANDFILLS

No one wants more landfills in their community. And certainly no one wants to live near a landfill. As long as we keep throwing out large amounts of trash, old landfills will fill up and new ones will have to be opened. Here the benefit from recycling is obvious: every cubic yard of material handled by a recycling or composting program is one less cubic yard of landfill space that is required.

In 1996, recycling and composting diverted a total of 130 million cubic yards of material away from landfills; in 2005, the projected diversion will be 195 million cubic yards. To handle this much additional waste—the situation we would have faced without recycling—we would have needed 64 more landfills, each of them large enough to serve the combined city populations of Dallas and Detroit, to be opened in our communities in 1996. Similarly, without recycling, we would need 92 such landfills in 2005.

Recycling is a highly effective strategy for reducing all the categories of health risks and pollution resulting from virgin material production.

Many pollutants are released by the extraction and processing of raw materials. Some of these pollutants are known to be carcinogenic or toxic to humans, and some have effects, such as creating acid rain, that are damaging to natural habitats. In addition, for many new and high-volume usage chemicals, the long-term effects are unknown. Extensive life-cycle analyses find overall emissions to all environmental media to be lower when we use recovered rather than virgin materials. Recycling is a highly effective strategy for reducing all the categories of health risks and pollution resulting from virgin material extraction and processing.

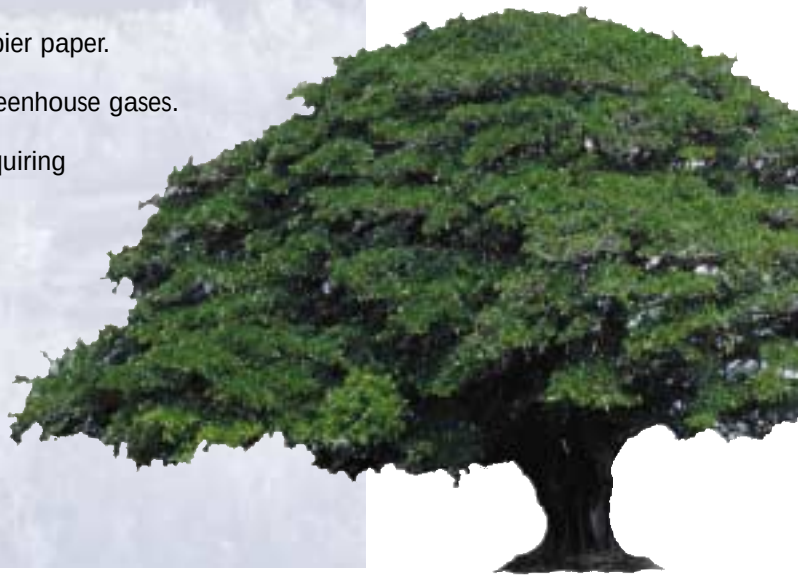
RECYCLING PREVENTS EMISSIONS OF AIR AND WATER POLLUTANTS

PURCHASING DECISIONS HAVE ENVIRONMENTAL IMPACTS

Consider the impact of Executive Order 13101's directive to all federal agencies to cease purchasing copier paper unless it contains 30 percent recycled content. For the paper industry alone, this decision will result in:

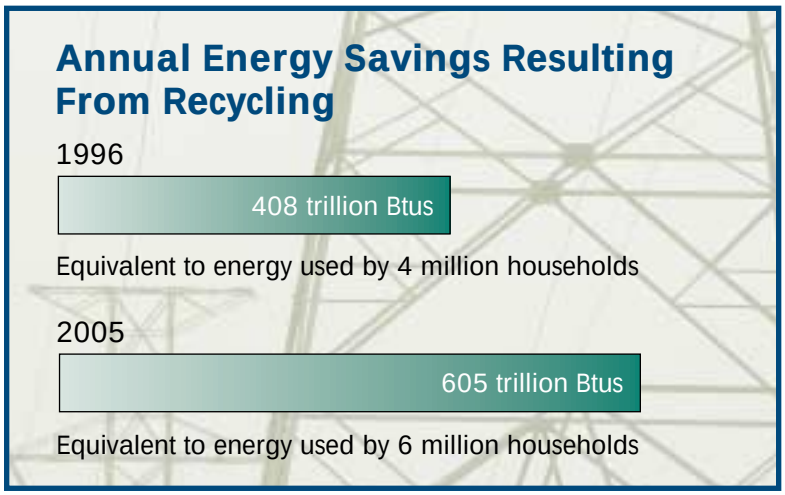
- 450,000 to 500,000 fewer trees cut down annually for paper production.
- 16,000 tons of carbon absorbed annually by the trees that remain standing.
- 12 percent reduction in energy used in producing copier paper.
- 14 percent average reduction in air emissions and greenhouse gases.
- 13 percent reduction in the amount of solid waste requiring disposal.
- 13 percent reduction in water pollutants.

Each of us makes purchasing decisions every day. The federal government only buys 2 percent of all the copier paper sold in the United States. Think of the positive impact on the environment if the remaining 98 percent of the copier paper sold contained recycled content.



RECYCLING SAVES ENERGY

The extraction and processing of raw materials into manufacturing feedstocks are some of the most energy-intensive activities of industry. Reducing or nearly eliminating the need for these processes, therefore, achieves huge savings in energy. Recycling of aluminum cans, for example, saves 95 percent of the energy required to make the same amount of aluminum from its virgin source, bauxite. The amount of energy saved differs by material, but almost all recycling processes achieve significant energy savings compared to virgin material production.



In 1996, recycling resulted in an annual energy savings of at least 408 trillion Btus, or 0.5 percent of all energy use nationwide. This is equal to the amount of energy used in 4 million households annually. In 2005, recycling is conservatively projected to save 605 trillion Btus, equal to the energy used in 6 million households.

Recycling of aluminum cans saves 95 percent of the energy required to make the same amount of aluminum from its virgin source.

When cans, bottles, paper, and other products are recycled, they are processed into raw materials that can be used in the manufacture of new products. Much of the recent investment in the paper industry has been in mills and machines designed specifically to handle recovered paper. Today, 67 percent of the steel produced in the United States is made from recovered steel. The fastest growing steel companies rely upon mini-mills, whose electric arc furnaces recycle iron and steel scrap using only a fraction of the energy required in traditional steel mills. This also allows the U.S. steel industry to compete more effectively in the global marketplace. In the aluminum industry, 42 percent of all production contains recovered aluminum. Our aluminum beverage cans contain an average of 55 percent recycled content. The industry buys more than $1 billion in recovered aluminum cans at prices that continue to make aluminum recycling an obvious economic success for community recycling programs across the United States.

The dollar value of materials recovered from solid waste has become substantial: $3.6 billion in 1996 and a projected $5.2 billion by 2005. Recovered paper and paperboard account for about one-third of the total in both years. In 1996, the market value of recovered paper and paperboard was 24 percent of the value of all pulp mill shipments. By 1997, the paper industry relied on recovered paper for 45 percent of its feedstock.

RECYCLING SUPPLIES VALUABLE MATERIALS TO INDUSTRY

Growing worldwide emissions of carbon dioxide, methane, and other with its potentially devastating weather-related effects.

RECYCLING CREATES JOBS

The traditional waste management system, involving garbage collection followed by landfilling or incineration, creates relatively few jobs. While no nationwide estimates of job creation are available, some local studies have found substantial impacts from recycling. Frequently, many of the recycling jobs are located in America's inner cities where job creation is particularly critical. Recent studies of employment in northeast and southern states, bolstered by studies of the remanufacturing industry, indicate that recycling activities employ more than 2.5 percent of manufacturing workers. Applying these studies to the entire nation, recycling and remanufacturing activities account for approximately 1 million manufacturing jobs and more than $100 billion in revenue.

Since unemployment is now at its lowest level in a generation, job creation might appear to be unnecessary. The fact that recycling continues to expand the job base and create tens of thousands of new jobs for a constantly growing labor force is a very important contribution toward sustaining stable employment rates in the future. Of equal importance is that many of these recycling jobs are in urban areas, and many are geared toward entry-level workers.

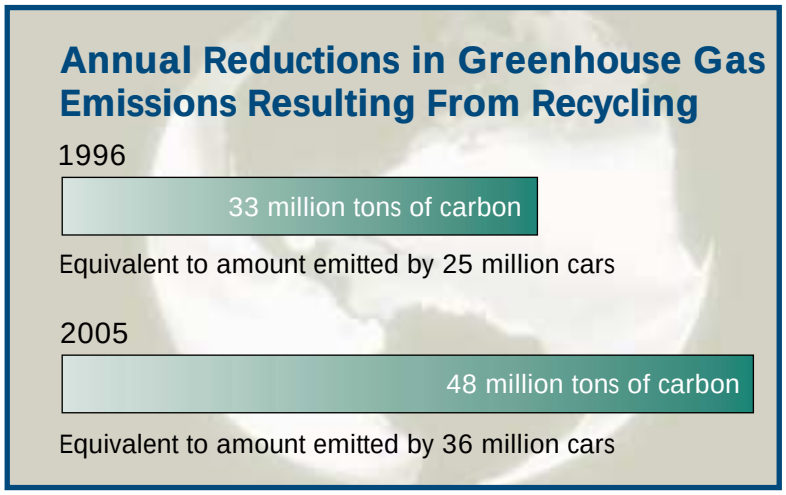
RECYCLING REDUCES GREENHOUSE GAS EMISSIONS

Emissions of carbon dioxide, methane, and other greenhouse gases contribute to global climate change. Reducing these emissions is a national and international environmental priority to which recycling contributes. The President recently indicated that the Administration will advance the technology to reduce greenhouse gases, noting that by increasing conservation and energy efficiency and using clean energy technologies, we can reduce our greenhouse gas emission by significant amounts in the coming years.

In 1996, recycling of solid waste in the United States prevented the release of 33 million tons of carbon into the air—roughly the amount emitted annually by 25 million cars. In 2005, recycling is projected to avoid 48 million tons of carbon emissions annually, or the equivalent of 36 million cars. These carbon emissions are avoided through a combination of energy savings, forest carbon sequestration, and lower methane emissions.

Production with recovered materials results in much lower emissions of carbon dioxide because the energy used during the extraction and processing of virgin raw materials is reduced. Net carbon emissions from producing a ton of new material are 4 to 5 times higher than producing with recovered material in the steel, copper, glass, and paper industries, and 40 times higher for aluminum. Most energy used for the manufacturing

greenhouse gases pose the serious long-term threat of climate change,



of consumer products involves burning of coal, oil, or other fossil fuels, either directly or because manufacturing plants buy electricity generated by fossil-fuel burning utilities. Recycling lowers energy use in producing everything from boxes to buses, and thereby lowers carbon emissions as well.

Even when an industry relies heavily on hydroelectric power, as the aluminum industry does, energy savings from recycling indirectly reduce carbon emissions. When recycling reduces the use of energy in aluminum production, low-cost hydroelectric power becomes available to other electric utility users. As they switch to hydroelectric power, this allows higher-cost electricity produced from fossil fuels to be cut back, which reduces carbon emissions.

Another reduction in the build-up of greenhouse gas emissions results from recycling paper. When we recycle, the paper industry's need for virgin wood pulp is reduced, which leaves more trees standing over longer periods of time. More carbon is retained in forests through the natural process by which trees absorb carbon and generate oxygen, thereby, keeping the carbon out of the atmosphere and reducing the potential for climate change.

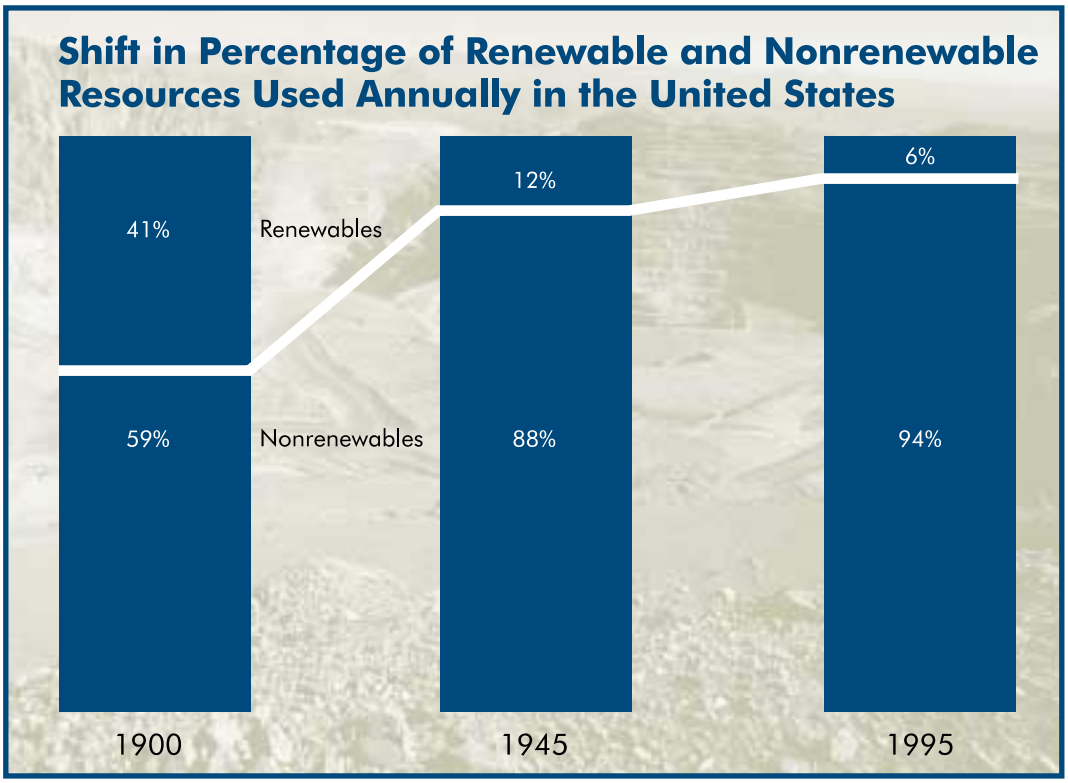
Finally, if organic wastes, such as leaves, grass clippings, and paper, are recycled instead of landfilled, we reduce production of methane, another major greenhouse gas with even greater climate change potential than carbon dioxide. Second only to fossil-fuel combustion, landfills are a leading source of greenhouse gas emissions in the United States. Anything that reduces the landfilling of paper (or other organic matter), therefore, reduces greenhouse gas emissions as well.

RECYCLING STIMULATES THE DEVELOPMENT OF GREENER TECHNOLOGIES

New technologies and industries are not created in a vacuum. Government incentives and regulations influence the direction in which private enterprise evolves. In the late 19th century, for example, when America's natural resources appeared to be limitless, huge government grants of land to railroads, mining interests, and timber companies opened the West to transportation and industry. Prevailing attitudes encouraged the intensive use of virgin raw materials. More recently, the federally funded interstate highway system, government-funded research, and federal involvement in the development of computers helped to establish many of the industries characteristic of the late 20th century. Recycling, along with other environmental initiatives, sets a similar context for today's industry.

The vast supply of low-cost materials from community collection programs has spurred many businesses to develop new and innovative technologies and products. A good example is plastic lumber, which was developed to utilize low-cost materials such as plastic grocery bags and wood chips or sawdust. Plastic lumber is long lasting, requires limited upkeep, and resists warping and decay. (Seen below, a bridge built of recycled plastic lumber at Ft. Leonard Wood, Missouri, which represents the reuse of about 13,000 pounds of mixed plastics that otherwise would have been landfilled.)

Existing technologies can likewise be adapted to utilize collected recyclables to manufacture products. One example of this is a technology originally developed for food processing that is being used to remove additional glass, metal, plastic, and rubber from cars now being recycled for steel. This allows the company to divert materials from landfilling to recycling, thus saving money. The company hopes to some day apply this technology to “mine” wastes from landfills.



As we enter the 21st century, the earth's natural resources are not limitless. Ultimately, coal, oil, iron ore, bauxite, and other nonrenewable resources are available only in limited quantities. Even renewable resources, such as paper and other wood products, are available only up to a limited annual capacity. And while material depletion is a concern, other environmental issues, such as climate change, might present even more pressing claims for immediate attention.

Today, the three-part test for recycling in the United States is to: first, sustain our commitment to supply those industries that have already invested in processing and using recovered materials; second, to expand the markets for recycling of additional materials; and third, to continue to improve recycling policies, processes, and technologies for recovering both renewable and, especially, nonrenewable resources.

RECYCLING CONSERVES RESOURCES FOR OUR CHILDREN'S FUTURE

the real bottom line—our children's future

Americans have done a remarkable job throughout our history in coming together to meet challenges. The challenges of the new millennium will be many, but none more critical than conserving the planet for our children.

WHAT CAN YOU DO? THE NATIONAL RECYCLING CHALLENGE

The Task Force on Recycling invites all citizens and sectors of American society—business, industry, government, and the public—to come together to maximize the many economic, environmental, and societal benefits that recycling provides. Let's work together now to ensure that our children will enjoy a material and environmental quality of life even better than our own.

The Task Force on Recycling gratefully acknowledges the assistance of EPA's Office of Solid Waste in the preparation of the material for this brochure. In particular, the contributions of Eugene Lee and Dr. George Garland have been invaluable. Additionally, we are grateful for the assistance of Dr. Ron McHugh from EPA's Office of Prevention, Pesticides, and Toxic Substances.

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—Tellus Institute, Boston, MA, Recycling Benefits Calculations, memorandum to Dr. George Garland, U.S. EPA, September 11, 1998.

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Much of the data utilized in preparing this document are from *Characterization of Municipal Solid Waste in the United States: 1996 Update,* U.S. EPA, May 1997 (EPA530-R-97-015).

The multimedia calculations for changes to federal paper procurement policy are derived from two sources: *Paper Task Force Recommendations for Purchasing and Using Environmentally Preferable Paper,* Duke University, Environmental Defense Fund, Johnson and Johnson, McDonald's, the Prudential Insurance Company of America, and Time, Inc., 1995; and calculations by the U.S. Department of Agriculture, Forest Products Laboratory, facsimile from Dr. Peter Ince dated April 22, 1998 to Dr. Ronald McHugh, U.S. Environmental Protection Agency.

Data on remanufacturing came from *The Remanufacturing Industry: Hidden Giant,* Robert T. Lund, Boston University, Boston, MA, January, 1996.

Data on shifts from renewables to nonrenewables came from the U.S. Geological Survey, Minerals Information Team, correspondence dated October 26, 1998.

Data on jobs and macroeconomic effects came from *Macroeconomic Importance of Recycling and Remanufacturing,* a study for the U.S. EPA, Office of Solid Waste prepared by Project Performance Corporation, McLean, VA, October 29, 1998.

Office of the Federal Environmental Executive
For further information visit <www.ofee.gov>

In accordance with Executive Order 13101, this brochure was printed on paper containing no less than 30 percent postconsumer fiber using soy-based ink.