Energy and Transportation

Task Force Report

The views expressed in this report are those of the Task Force members and were not the subject of endorsement by the full Council. Many of the federal officials who serve on the Council also serve on the Council's Task Forces and participated actively in developing the Task Force's recommendations, but those recommendations do not necessarily reflect administration policy.

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Preface

This Task Force report is one of seven prepared for the President's Council on Sustainable Development. The Council was established by President William J. Clinton through Executive Order No. 12852 on June 29, 1993, to:1

- Make recommendations to the President to advance sustainable development, including a national sustainable development action strategy.
- Expand public awareness of the challenges inherent in moving toward sustainability, including the need to manage the nation's natural resources carefully.
- Institute a Presidential Honors Program recognizing exemplary efforts that advance sustainable development.

Members of the Council are leaders in industry, federal government, and environmental, labor, and civil rights organizations.

Shared responsibility for success was a hallmark of the eight Task Forces organized by the Council. Their purpose was to provide advice to the Council in major issue areas, spur dialogue, and involve the public. The work of Task Forces culminated in policy recommendations for consideration by the full Council. Individual Council members served on the various Task Forces, together with a network of several hundred professionals from throughout the country.

The eight Task Forces were: Eco-Efficiency; Energy and Transportation; Natural Resources Management and Protection; Population and Consumption; Principles, Goals, and Definition; Public Linkage, Dialogue, and Education; Sustainable Agriculture; and Sustainable Communities. Each developed a work plan responding to the challenges posed by the respective sets of issues and developed recommendations through workshops, demonstration projects, case studies, regional round tables, public comment, and other methods.

The Task Force reports serve as a record of each Task Force's deliberations and contributions to the Council's deliberations. This report is intended to illustrate the lessons learned and advice that was prepared for the Council's consideration by the Energy and Transportation Task Force.

The Energy and Transportation Task Force expanded its membership beyond the nine Council members who participated to include 32 representatives of diverse and often divergent views on energy and transportation issues affecting the United States. Their diversity contributed to the richness of the debate as consensus was sought. In the end, recommendations were finalized using majority decisions. Therefore, not all recommendations and goal indicator levels were agreed to by all Task Force members.

The Task Force expected its ideas would be debated and further refined by the Council, and later with an even larger constituency of the public and governmental institutions. Although its work was extensive, for practical reasons the Task Force did not seek to provide solutions to all of the challenges associated with energy and transportation. This report is intended to help stimulate a national debate, not only among experts and policymakers, but with citizens who have not discussed these issues before...but who are critical to sustainable development.

Executive Summary

However, new strategies must be developed to make even greater progress in the next 25 years and continue the American tradition of increasing economic and other opportunities while improving environmental quality. The fundamental challenge of long-term energy and transportation policy is to create a future that simultaneously achieves greater economic prosperity, environmental protection, and social equity. Although these goals have often been cast as mutually exclusive tradeoffs, there is ample evidence that steps can be taken to promote all three simultaneously.

Just as economic activity is both the cause of and solution to many environmental and social problems, access to energy and transportation services creates immense economic and social benefits but also can have significant negative consequences. Changes in technology and economic behavior offer an effective way to reduce the environmental and social burden of energy production and use. Steps taken to encourage change should strive to promote overall prosperity, use the power of market forces when possible and appropriate, and provide a wide variety of affordable consumer choices.

The Energy and Transportation Task Force relied on a collaborative approach involving more than 30 representatives from diverse interests, including seven private sector companies, energy, environmental, labor and community organizations, federal, state, and local governments, and others. The Task Force was also at times augmented by other experts in various fields.

The members began their work by adopting a scenarios planning process to understand how energy and transportation systems might evolve. Four plausible scenarios were constructed as aids for evaluating the implications of potential policy choices. The Task Force reached the following broad conclusions.

- Despite measurable progress in enhancing environmental quality, some current trends are unsustainable; changes will be necessary to shift toward a more sustainable future.
- A desire to achieve greater social equity will change the nature of environmental protection and possibly constrain some options.
- There is value to preparing policies to avert or adapt to the threat of a potential ecological crisis.
- Rapid technological advances may help achieve economic aspirations and ecological goals, but may not by themselves adequately improve social equity.

Based upon the lessons learned from the scenarios, the Task Force crafted three strategic goals.

- Pursue economic, environmental, and social policies that encourage global competitiveness and a long-term economic growth rate of at least 2.5 percent per year. Environmental improvements must be realized while providing opportunities and income gains that are distributed broadly throughout society and contribute to reducing poverty and inequity.
- Improve the economic and environmental performance of U.S. energy supply and use while ensuring that all Americans have access to affordable energy services and increasing the competitiveness of American business.
- Improve the economic and environmental performance of the US transportation system while increasing all Americans' access to jobs, goods, services, and recreation.

These broad goals are accompanied by the rationale behind them, as well as specific indicators of progress. The indicators serve to guide policy development and as yardsticks for measuring progress toward the goals. The Task Force made eight policy recommendations to achieve these goals.

Four policy recommendations tap the power of the market. Tax reform policies are called for to spur investments in clean technologies and meet environmental goals at less cost. Temporary market incentives are recommended to maintain the emphasis on energy efficiency during the transition to

a competitive electric power market. Specific expansions of existing programs to purchase and scrap high-polluting vehicles are recommended to achieve more permanent environmental results and greater job opportunities.

A policy recommendation for performance-based regulatory flexibility is designed as a means to help achieve national environmental goals at lower cost.

Two other policy recommendations rely on community-based approaches. These are to remove federal barriers to market-based congestion management, and also to recognize potential home buyer's greater borrowing power in areas with easy access to mass transit.

The final policy recommendation highlights and recommends improvements to a group of specific federal polices already in place that are helping to attain strategic goals.

The strategic goals, indicators, and policy recommendations were debated by the Council members together with the work of the other policy Task Forces. The end result, after more than two years of intense debate, listening, and learning, was a consensus report by the 25 members of the Council to the President of the United States entitled *Sustainable America: A New Consensus for Prosperity, Opportunity, and A Healthy Environment*.[2] At the time of its publication, many organizations - ranging from state and local governments, to businesses, community groups, and Council members - and the President himself had announced plans to implement many parts of the report.

Introduction

"The Earth belongs... to the living: ... No generation can contract debts greater than may be paid during the course of its own existence."

- Thomas Jefferson in a letter to James Madison, 1789

No doubt Thomas Jefferson was referring to economic debts. However, the ideas he expressed--that one generation should not leave a debt for another to pay--is equally true when tied to environmental and social problems. The narrow and shortsighted decisions of today can leave future generations with fewer opportunities to achieve economic prosperity, mounting local and global environmental problems, and a widening gap between the rich and poor.

Although there are many encouraging trends today that these problems can be resolved, there are also signals for increasing concern. Some question whether this great and prosperous country will continue to fulfill the expectation that each generation of Americans should enjoy a better quality of life than the previous.

The World Commission on Environment and Development, the Brundtland Commission, defined sustainable development in its 1987 report, *Our Common Future*, as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."[3] This definition was adopted by the President's Council on Sustainable Development and is very much in keeping with the values espoused by Thomas Jefferson.

In building on the work of the Brundtland Commission, the members of the Council and the Energy and Transportation Task Force also explicitly recognized that economic prosperity, environmental protection, and social equity must be pursued simultaneously. Although these goals have often been viewed as competing tradeoffs, there is ample evidence that these objectives are in fact interrelated. The economic growth and environmental improvement over the past 25 years are clear evidence that one need not come at the expense of another. These interrelationships are equally true in long-term energy and transportation policy.

Although technology and policy have made great progress in the effort to reduce human impact on the natural world, scientists and policymakers are only beginning to measure and understand the scale of the fundamental changes driven by technology, a growing population, and a highly competitive and globally interconnected economy. In all of human history, no period of time can match the changes currently occurring in the global environment.

Economic activity is both the cause of and solution to many environmental and social problems. On one hand, it can generate waste and pollution and contribute to environmental deterioration, as well as create health risks that disproportionately affect certain segments of society. Nonetheless, a robust and prosperous economy is essential to creating jobs and material goods for a growing population. It provides people with the opportunity to meet their physical needs and fulfill their individual aspirations. It generates the wealth necessary to make important investments in cleaner technologies and better practices to protect public health and the natural world.

Access to energy and transportation services creates immense economic and social benefits as well. Correspondingly, energy and transportation choices--by institutions in the public and private sectors, as well as individuals--have important effects on society. These choices influence the U.S. and global environment, the prices of the most basic goods and services, the international competitiveness of employers, the ability to reach important destinations, government deficits, and national security The decisions of today have long-term impacts in these areas.

Changes in technology and economic behavior offer an effective way to reduce the environmental and social burden of energy production and use and can frequently improve business performance. Policies designed to limit negative impacts should operate within the context of competitive markets and promote overall prosperity. Providers of energy and transportation services should have incentives to continuously improve their environmental performance and reap economic rewards for doing so while providing affordable services. Consumers of these services must have a wide range of choices and incentives that yield efficient patterns of energy use, which will maximize the overall social benefits of energy in an affordable and environmentally sound manner. Policy should focus on removing Institutional, economic, and regulatory barriers that prevent the nation from moving in these directions.

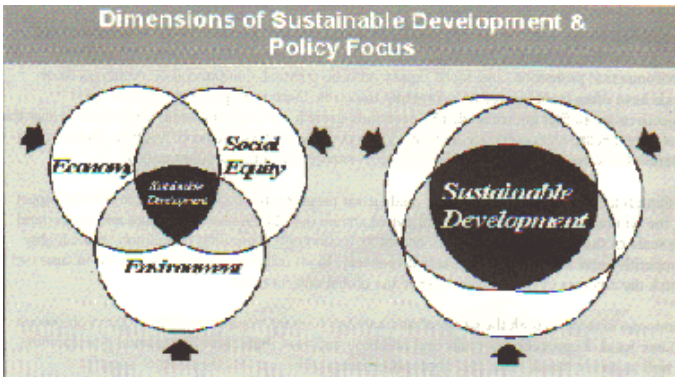


Figure 1 Dimensions of Sustainable Development & Policy Focus

However, it is important to recognize the global context of energy and transportation issues in crafting strategies for the future. People in developing countries seeking to escape from poverty and high health risks aspire to the same kind of economic prosperity enjoyed in the United States and other developed nations. If these countries follow the same paths of development historically pursued by the industrialized nations they will reinforce many unsustainable trends, and possibly even undermine progress made by the United States and elsewhere in the world.

Collective actions--of individuals, families, communities, businesses, nongovernmental organizations, and all levels of government--can move the nation to a more sustainable future by recognizing the interrelationships between economic, environmental, and social challenges. Of the entire range of issues stemming from energy and transportation, the Energy and Transportation Task Force focused only on goals and policies that would simultaneously address all three challenges. (See figure 1.)

Nonetheless, policy recommendations generally can be only part of the solution. All change in society ultimately depends on the commitment and understanding of individuals. As a nation, we must foster individual and collective responsibility for the common good. We must improve access to information and opportunities, as well as the power they create. Progress will require the people of the United States to adopt stewardship in the broadest sense as an individual, institutional, and corporate value.

CHAPTER 1

FINDINGS

The Energy and Transportation Task Force was to develop both short- and long-term policy Recommendations for the Council that could help guide the nation toward a more sustainable energy and transportation future. Indispensable to the Task Force's deliberations was information drawn from a wide variety of sources, and the Sustainable Energy and Transportation Scenarios Project designed to illustrate policy implications of alternative futures.

Profile of Energy and Transportation Use

The following charts, graphs, and discussion provide basic background on many important aspects of the production and use of energy and transportation services in the U.S. economy.

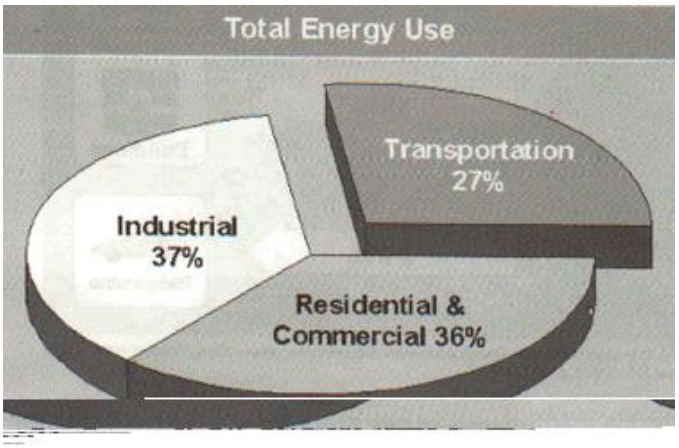


Figure 2 Source: Monthly Energy Review February 1996, U.S. Department of Energy, Energy Information Agency (Washington, D.C., 1996), p. 25, table 2.2.

In the United States, energy is used about equally for commercial and personal transportation, residential and commercial buildings, and industrial production. Energy use in each of these areas was an important concern to the Task Force.

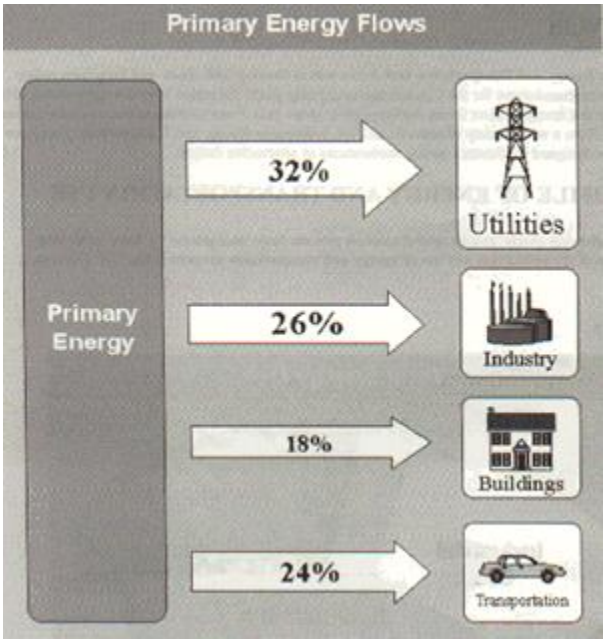


Figure 3 Source: U.S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 1995* (Washington, D.C., 1995), p. 100, table B2.

Both the efficiency and nature of the technology used to convert energy sources to electricity for consumption affects economic prosperity, environmental protection, and social equity. Electric utilities and independent power producers convert 32 percent of all energy to electricity for sale to end users. Energy from oil, coal, natural gas, and renewable energy sources is also consumed directly in transportation (24 percent), industries (26 percent), and buildings (18 percent).

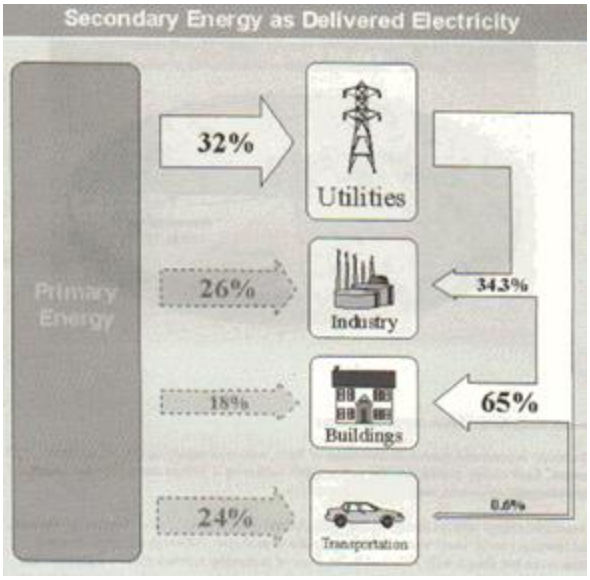


Figure 4 Source: *Annual Energy Outlook 1995*, p. 109, table B8.

In addition to consuming primary energy, end users also purchase electricity from utilities and independent power producers. Buildings consume 65 percent, industries 34.3 percent, and transportation 0.6 percent of electricity sold in the United States.

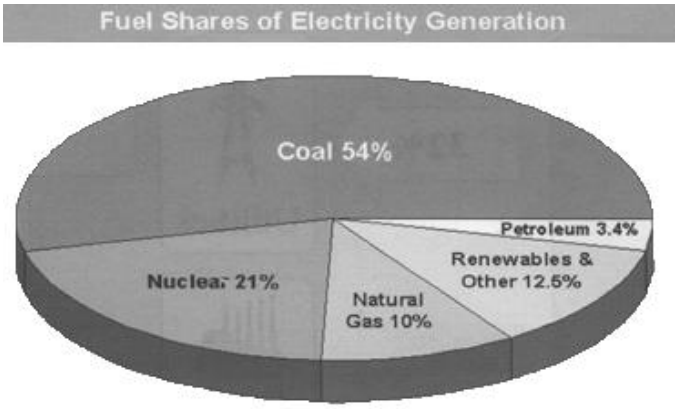


Figure 5 Source: *Annual Energy Outlook 1995*, p. 100, table B2.

Electricity is produced from a diverse range of fuels, with coal supplying the largest share--55 percent. Each energy source, and the technologies used with it, affects economic performance, environmental emissions, and costs for consumers.

Renewable energy sources include wind, solar electric (photovoltaic), solar thermal, geothermal, and biomass (wood, wood waste, refuse, agricultural products). Although the environmental impacts are not always fully reflected in the costs of competing technologies--a practice that may place cleaner technologies at a competitive disadvantage--renewable energy systems are still becoming competitive in many parts of the nation. For example, wind turbines are producing commercial power for one million Americans in California and the Midwest, and solar electric cells are competing in niche domestic markets.4 Renewable energy systems often are very competitive today in international markets, particularly in the developing world where millions of communities have no electric power.

Although environmental objectives are only one of the three components of sustainable development, pollution can be an important indicator of how efficiently economic and natural resources are used. Various emissions from energy and transportation use are related to different environmental concerns-- such as local air quality and acid rain. Carbon dioxide emissions are of concern because of their important role in changes that are occurring in the chemical composition of the atmosphere that influence global climate. These changes are occurring at an accelerating rate with consequences that are difficult to predict with certainty or precision. Moreover, they cannot be quickly reversed after their consequences have been fully understood.

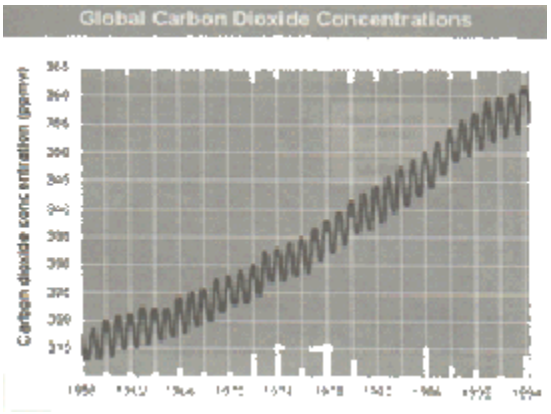


Figure 6 Source: Intergovernmental Panel on Climate Change, *Climate Change 1994--Radiative Forcing of Climate Change*, J. T. Houghton et al., eds. (Cambridge: Cambridge University Press, 1995), p. 43.

The Council heard a set of presentations concerning the science of climate change, the risks, and the uncertainties. The Earth is kept at a life-supporting temperature by a blanket of gases that trap some of the energy the earth radiates. Water vapor, carbon dioxide, methane, and nitrous oxide are the principal gases that create this natural greenhouse effect. With the industrialization of the past 150 years, atmospheric concentrations of greenhouse gases have increased and new greenhouse gases have been added to the atmosphere. The most important greenhouse gas that is influenced by human activity is carbon dioxide, the buildup of which results primarily from burning fossil fuels and deforestation. Concentrations of carbon dioxide in the atmosphere have

increased by about 30 percent over preindustrial levels.[5] (See figure 6.)

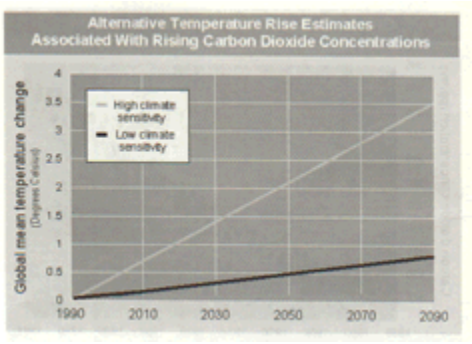


Figure 7 Source: Intergovernmental Panel on Climate Change, Summary for Policy Makers - Working Group I, draft (Washington, D.C., 1995).

The buildup of greenhouse gases in the atmosphere is expected to lead to an enhanced greenhouse effect, popularly referred to as global warming. Because of the enormous complexity of the Earth's climate system, it is not possible to predict with certainty the temperature rise or other effects of global warming. The Earth has warmed by about I° F since preindustrial carbon dioxide levels. Subsequently to the Task Force's deliberations, the international scientific community, as represented by the Intergovernmental Panel on Climate Change, stated that the balance of evidence suggests emissions of greenhouse gases and aerosols have caused a discernible human influence on global climate. The models used by the Intergovernmental Panel on Climate Change* predict a warming of 0.8°>C to 3.5° C by the year 2100, although the resulting effects are much less clear.[6] (See figure 7.) Generally though, models predict that it will lead to a rise in sea levels, and suggest the possibility of drought and/or floods in some places and the possibility of more extreme precipitation events.[7]

* The Intergovernmental Panel on Climate Change was convened by the World Meteorological Association and the United Nations Environment Program. Its second assessment, completed in late 1995, involved 2000 scientists and technical experts from 130 countries as authors and reviewers.

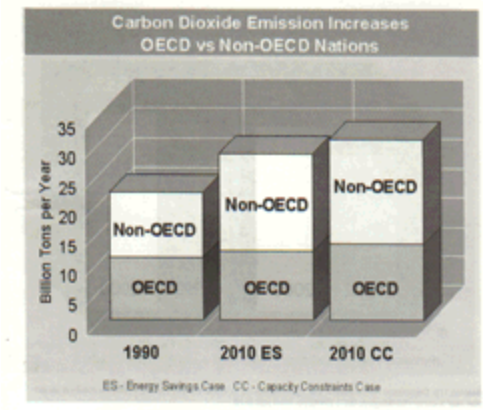


Figure 8 Source: International Energy Agency, *World Energy Outlook 1995*, OECD/IEA (Paris, 1995), p. 50, table 2-2.

U.S. emissions of carbon dioxide account for approximately 25 percent of global emissions. In the future, however, carbon dioxide emissions from developing countries will increase rapidly as their economies develop. (See figure 8.) If current trends continue, without changes in technologies and consumption, emissions from developing nations will surpass those from the Organization for Economic Cooperation and Development (OECD), former Soviet Union, and Eastern Europe in several decades.' Nonetheless, for decades to come the industrial nations will be responsible for most of the carbon dioxide in the atmosphere resulting from human activities.

It is clear that the United States cannot solve the potential problem of climate change alone. Further, it is also clear that unless the industrialized nations demonstrate that a different development path is possible and beneficial, the rest of the world will be reluctant to join in efforts to resolve the problem. Solutions and innovations developed for the United States can be adapted to conditions and cultures in developing countries to help them achieve their aspirations for an improved quality of life.

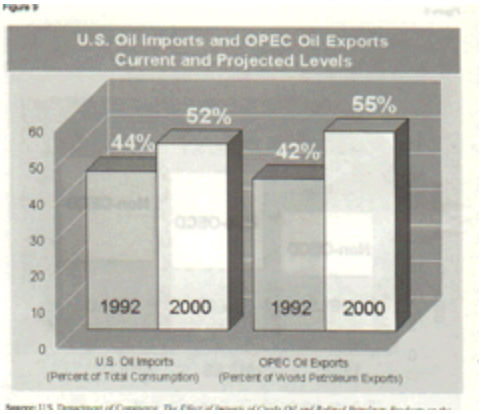


Figure 9 Source: U.S. Department of Commerce, *The Effect of Imports of Crude Oil and Refined Petroleum Products on the National Security* (Washington, D.C., 1994), pp. ES-4 and 11-10.

Although the United States is an oil producer, increasing U.S. consumption of petroleum products from politically unstable regions of the world is an important economic and national security concern. U.S. imports of petroleum products are projected to continue to rise, as are oil exports from the Organization of Petroleum Exporting Countries (OPEC) in the Middle East. (See figure 9.)

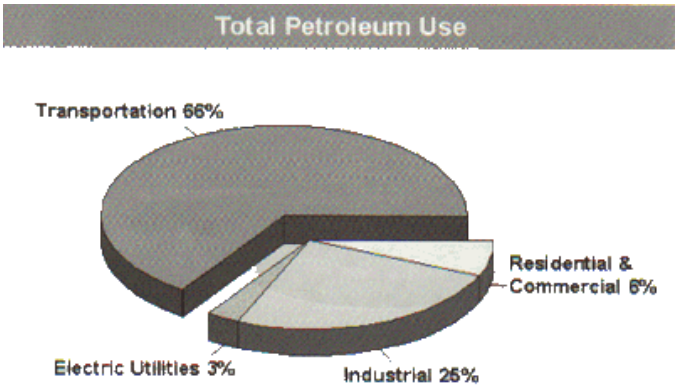


Figure 10 Source: *Annual Energy Outlook 1995*, p. 113, table B11.

The US transportation system relies almost entirely on oil, accounting for 64 percent of the oil consumed in the United States. (See figure 10) Improved technology continues to offer the potential for more sustainable fuels and vehicles. However, an array of alternative domestic fuels is beginning to appear in the marketplace along with vehicles capable of using them. Natural gas, other alternative fuels, and electricity power three percent of the nation's vehicles. (See figure 11.)

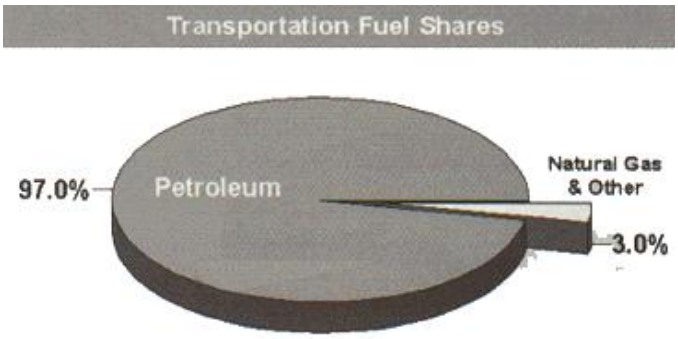


Figure 11 Source: *Annual Energy Outlook 1995*, p. 100, table B2.

Major gains have been made in automobile fuel efficiency in the last 15 years, but those gains have been overwhelmed by other market forces and demographic changes to maintain and increase oil consumption. The real cost of driving per mile has dropped over the same period.[9] Americans are again turning to bigger cars and light trucks, and are driving more miles. Further, even today's more efficient vehicles only turn an average of 20 percent of the energy they consume into actual motion.[10] All of these factors lead to increased oil imports and continued air pollution problems in metropolitan areas.

Innovative community design that conveniently locates homes, employment, markets, and recreation can reduce the need for motorized travel. Further, innovations in the telecommunications industry are increasingly enabling people to share ideas and produce goods and services with less travel.

There are important differences in the transportation challenges facing rural areas and those found in large U.S. cities and their surrounding suburbs, although these challenges stem from a related set of factors. The latter part of the 20th century has been characterized by increased concentration of the U.S. population in metropolitan areas. The number of Americans living in metropolitan areas increased 65 percent from 1970 to 1992, a result of net migration of people to metropolitan areas as well as overall population growth. II Despite the improvements in vehicle efficiency of the past 20 years, transportation in many metropolitan areas is characterized by increasing commutes for work and other activities, rising traffic congestion, continued air quality challenges, aging inner city infrastructure, and increased pressure on public spaces and services. All of these factors lower the quality of life and have contributed to a nationwide flight from high-density central cities to suburban areas. As populations and economic development relocate to lower-density areas where homes, schools, stores, and jobs are more spread out, more people need to travel farther to reach employment and other important destinations. Traffic congestion, and the waste of fuel and time increase as do their associated economic, environmental, and equity impacts.

In some rural areas, the population movement to the cities has contributed to economic decline, and has increased the distances between people and economic opportunities, and essential goods and services. The effects on economic prosperity, environmental performance and social equity are significant--particularly given lower-income individuals' ability to reach these important places. As communities develop opportunities to revitalize their local economies, the increased distances between people and places become a critical hurdle. Productive and expanding rural industries often find large segments of the potential unemployed workers reside more than 20 miles away. Further, segments of rural populations not only find themselves without a means to reach prospective employers, but also necessary goods and services such as health care.

The Sustainable Energy and Transportation Scenarios Project

Given this background information, the Energy and Transportation Task Force members asked how the energy and transportation sectors might change in the future. The Task Force's challenge was to look systemically at the current energy and transportation picture to understand its many interrelationships and how they relate to economic, environmental, and social equity objectives.

The Task Force saw a need to understand how various changes in society could affect the way today's decisions might play out in the future. To this end, the Task Force conducted the Sustainable Energy and Transportation Scenarios Project.

As collaborative tools, scenarios allow multiple stakeholders to address issues such as sustainability that do not conform to typical "expert report" solutions. Sometimes, issues and solutions are clear; the problem of a broken leg and what to do about it is a good example. Alternatively, the issue may be clear, but the solution is not; with arthritis, the patient and doctor know the problem but are not sure of the treatment. In other situations like sustainability, both the issue and the response are unclear. Here, the definition of sustainability--and the solution--lies with stakeholders; experts only advise because the economic, environmental, and social dimensions of sustainability transcend any single discipline.

The Sustainable Energy and Transportation Scenarios Project yielded important lessons that were critical to the development of the Energy and Transportation Task Force goals and policy recommendations for the Council's consideration. The Global Business Network,* a consultant with considerable experience developing scenarios for strategic and policy planning, was retained to facilitate the project and help provide management and logistics support.

> ** For more information on scenarios planning, see* The Art of the Long View, by Peter Schwartz, *Doubleday 1991.*

The project began by drawing together the wealth of existing research to understand the dynamics shaping the energy and transportation sectors. Members identified the factors and elements that significantly influence energy and transportation, including economic structure and performance, environmental issues, degree of social equity, technology developments, population changes, land use and community design, societal values, and political developments.

These so-called driving forces were combined in different ways to lay out 15 preliminary paths---scenarios--these sectors may take by the year 2025. After further research and information gathering, members more fully developed and refined alternative scenarios (As part of the Council's regional visit to the Great Lakes area in July of 1994, Council members and the public were given the opportunity to comment on the scenarios project and the progress to date.) Later, characteristics of energy and transportation use in each scenario were assigned numerical values according to the "plot" of each scenario narrative. These characteristics were modeled to compare the energy and transportation use patterns of each possible future;

As part of the scenarios project process, Task Force members identified a vision of a more desirable and sustainable world. Its characteristics include:

- An overall improved standard of living (in the United States and internationally).
- Greater individual empowerment and personal freedom, including "time for ourselves."
- A healthy environment, locally and globally.
- Science and technology directed to better meet human needs.
- Increased efficiency and more options for high-quality energy and transportation services.
- More inclusive and rational policymaking.
- World peace and elimination of global conflicts.

Members drew lessons from each of the scenarios by identifying ways each did not conform to their vision of a

desirable future. These conclusions played an important role in helping the Task Force members to craft strategic Task Force goals and indicators and shape the policy recommendations to help achieve them.

Scenario Summaries and Lessons Learned

Following are summaries of the four scenario narratives along with the lessons learned from each. As a reminder, scenarios are not predictions--they describe how the future "might," not "should" unfold. In addition to the scenario narratives summarized below, the complete scenario narratives can be found in the appendices.

The scenarios are depicted graphically over time in figure 12. The vertical axis represents a broad measure of societal welfare; although no index exists today to describe this measure, it is intended to be a synthesis of the many parameters of sustainable development, including standard of living, environmental conditions, and social equity.

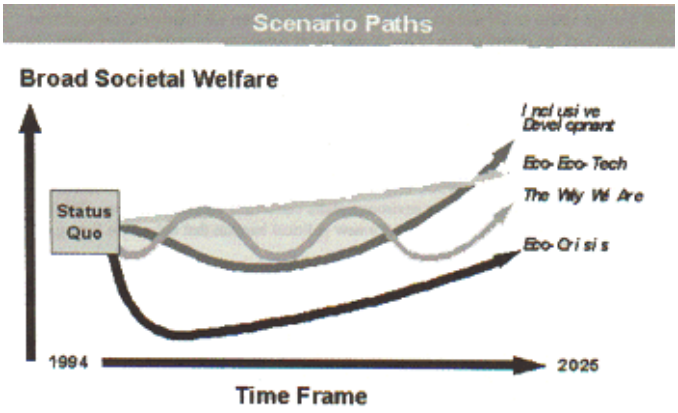


Figure 12 Source: This graph was created by *The Global Business Network* as part of The Sustainable Energy and Transportation Scenarios Project.

The Way We Are

This is a world where gradual change continues, but the future is not necessarily a mirror of the past. The restructuring of the global economy is the major force shaping this scenario. Fragmentation, not cooperation, keeps people's lives a bit unsettled. Even with mixed signals, however, incremental improvements abound giving most people, but not all, a sense of progress. A shifting Job market in the United States and the resulting underemployment keep real incomes stagnant in many sectors well into the new century. In this world, people desire more mobility, but also face increasing congestion. Although energy stays relatively abundant and cheap, other issues, such as environmental concerns and economic security, encourage protracted policy debates. Looking back from 2025, observers would note that most Americans are better off, in part due to technology instead of rapidly increasing incomes, but remain concerned by chronic social problems and a latent perception that the United States is no longer the world's leading economic power.

Conclusion

If we continue The Way We Are, technology will advance and efficiencies improve, but growth in global and U.S. population, energy use, and transportation demand may overwhelm the gains from improved technology. This will result in overall declining environmental conditions, while chronic income disparities persist. Additional policies would be required to improve environmental outcomes and to narrow the widening income gaps while meeting energy and transportation service demands.

Inclusive Development

This is a world where social and economic priorities overwhelm environmental ones, at least temporarily. Over the course of the 1990s, a new social consensus emerges in the United States, acknowledging that the widening gap in incomes and advancement opportunities is not sustainable. In part, this consensus is driven by a growing lower-middle class, which increasingly crosses racial and gender distinctions, as well as by a restructuring economy which disenfranchises traditional workers - the heart of middle America--who face fewer and lower paying jobs. The groundwork for this scenario was laid in the 1970s, when the average American made limited economic progress, real income growth slowed, and many began sliding backwards. As the trend continued into the 1990s, concerns about social justice came into the forefront--a concern that already motivated many environmentally concerned citizens. The Inclusive Development scenario presents the story of a new political bargain that delays the timing of environmental progress.

Conclusion

If social equity concerns dominate the political agenda in the next decade, a new paradigm of Inclusive Development could emerge. A focus on social equity, public investment, and enhancing communities could change the manner in which near-term environmental issues are considered and alter the path of technological advances. International environmental progress and social equity would be secondary to domestic issues. However, the new political alignment could serve as a foundation for aggressive long-term domestic and international environmental policies.

Eco-Crisis

In this future, the onset of global climate change is characterized by increasing weather variability and turbulence, which quickly reaches crisis intensity by the year 2001. This phenomenon is not limited to the United States, as Asia (particularly Japan), Europe, and other parts of the globe are hard hit. Following close behind are two nuclear accidents in Europe, which surprise and shock the world. The response in the international community is a realization that closer cooperation, not competition and other fragmentation is the key to future survival and prosperity. A series of steps, which move beyond strictly environmental concerns to include trade and security, are taken to restructure and ensure a more harmonious relationship between the environment and economic development.

Conclusion

Although scientific uncertainties remain, a plausible scenario of ecological crisis could arise, for example from the perception of imminent climate change. A crisis scenario challenges policymakers to recognize possible signs of an impending crisis, to understand the extent of the crisis and what present actions might reduce its likelihood and impact, and to develop appropriate policies in the interim that could help respond to the crisis if it occurs. A near-term strategy of prudent avoidance that concentrates on high-payoff and low-cost measures, as well as policies that align 'incentives with long-term environmental objectives, could provide a rational foundation for more aggressive actions. Constructive international engagement would also enhance the ability to respond to global environmental concerns on an international basis.

Eco-Eco-Tech (Economic-Ecological-Technologies)

This is a world of increasing environmental awareness linked with a strong U.S. (and global) economy, technological developments, and governmental initiatives to create cooperative "win-win" solutions. Many of the pieces were already in place by the 1990s, but much like the advent of personal computers and their promise of increased productivity, the network linkages and timing are key. Other developed countries follow the US lead but equity disparities slow economic growth in the rest of the world and these nations are slower to catch up. Unlike the previous scenarios, this world is driven by the values of the baby boomers, who occupy top management and policy positions and favor market and incentive-based approaches. But as this scenario plays out, not everyone in society benefits from these technological changes, with technological elites receiving most of the gains from economic and enviromental improvements.

Conclusion

A scenario dominated by widespread use of advanced Economic, Ecological Technologies could portend a future where economic growth and healthier ecosystems are mutually reinforcing. Government can act as a catalyst and consensus builder by supporting policies that increase technological innovation, deployment, and rapid turnover of capital stock. These policies could also have global impact if developing countries such as China and India adopt advanced technologies. Although this scenario may represent a move toward sustainability, sustainability is not assured within a 30-year time horizon. In particular, accelerating technological and structural change could create a more polarized income distribution if technology "elites" appropriate the resulting economic gains. Ensuing social equity may constitute the greatest challenge for sustainability under a technology-dominated scenario.

OVERALL LESSONS FROM THE SCENARIOS

Despite measurable progress in enhancing environmental quality, some current trends are unsustainable. Changes would be necessary to shift toward a more sustainable future.

A desire to achieve greater social equity could change the nature of environmental protection and possibly constrain some options.

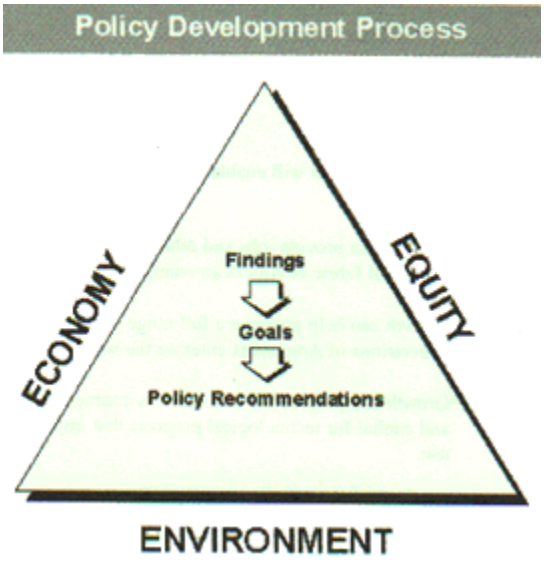
There is value to preparing policies to avert or adapt to the threat of a potential ecological crisis.

Rapid technological advances may help achieve economic aspirations and ecological goals but may not by themselves adequately improve social equity.

CHAPTER 2
TASK FORCE GOALS & INDICATORS

Drawing on its findings, the Energy and Transportation Task Force developed three strategic goals that were used to craft the policy recommendations discussed in the next chapter. The first goal deals with sustainable economic growth as a whole; the second with sustainable energy, and the third with sustainable transportation.

The following presentations of each goal gives the rationale behind it, and offers an analytical context for the indicators. The numerical values included in the indicators, are targets to strive for, not mandates to achieve irrespective of cost. The analytical context for the indicators generally shows historical trends and recent forecasts to give a sense of how much of a "stretch" it would take to reach these levels. The Task Force did not, however, conduct a rigorous analysis of technological or economic feasibility and a consensus on indicator levels was not reached.



It is important to note that the indicators of progress under each goal are interrelated. In most cases they are complementary and reinforcing; for example, the transportation and fossil electric generation measure would contribute significantly to the aggregate energy efficiency measure. Even though the attainment of several measures may make others redundant, each measure has a distinct rationale that is worth preserving. Moreover, it is possible that attaining some measures may increase the difficulty of achieving others, for example increasing the share of renewable energy may be more difficult when increased energy efficiency dampens the demand for new power generation, and vehicle efficiency improvements can reduce driving costs and possibly lead to increased vehicle miles traveled.

Goal 1

SUSTAINABLE ECONOMIC GROWTH

Pursue economic, environmental, and social policies that encourage global competitiveness and a long-term economic growth rate of at least 2.5 percent per year. Environmental improvements must be realized while providing opportunities and income gains that are distributed broadly throughout society and contribute to reducing poverty and inequity.

Indicators of Progress

The Energy and Transportation Task Force did not develop indicators for this goal beyond a 2.5 percent annual increase in the Gross Domestic Product (GDP) recognizing the Council as a whole would best supply indicators for the other aspects of the goal.

Rationale

The energy intensity of the economy (energy consumed per dollar GDP) is a fundamental measure of sustainability that combines both technological efficiency (energy consumed per unit of goods and services provided) and the weighted mix of energy-using activities that make up the national economy.

- Despite the progress made in the past 25 years and the potential contributions of laws enacted but not yet fully implemented, many existing patterns of energy production and consumption deplete natural resources, degrade ecosystems, and create significant amounts of solid waste, water pollution, and atmospheric pollution.

- Energy efficiency and waste generation are linked. Pollution and waste are inefficiencies. More efficient industrial processes and technologies will increase productivity and produce less waste and pollution.

- Cost-effective approaches to increase end-use efficiencies will have benefits in all three dimensions of sustainability:
  - Reducing energy costs to consumers provides equity benefits.
  - Reduced energy costs for manufacturers benefits the economy, thereby increasing international competitiveness. By lowering waste production, increased efficiency also leads to lower regulatory compliance costs.
  - Increased efficiencies translate into fewer environmental impacts from pollution and waste.

- Renewable energy sources generally have fewer environmental impacts than do fossil fuels and have important potential use domestically and overseas.

Context: Energy Efficiency

- Reduce average energy consumed per dollar of economic development from 1990 levels by 10 percent by 2000, 30 percent by 2010, and 50 percent by 2025 (primary energy per unit of real Gross Domestic Product (GDP).

The energy intensity of the economy (energy consumed per dollar of GDP) is a fundamental measure of sustainability that combines both technological efficiency (energy consumed per unit of service provided) and the mix of energy-using activities that make up the national economy. Both of these components tend to reduce energy intensity as the economy evolves.

Costs have declined significantly for renewable energy technologies in the past 15 years.[16] When reduced costs are combined with generally lower environmental impacts many renewable energy technologies are now competitive in niche markets in this country.

Context: Economic Growth

Historical Data

Annual growth in real GDP ranged from -2.2 percent to 6.2 percent during the years 1986-1994. Over the 14-year period the average annual growth rate was 2.5 percent. Since World War 11 average annual growth rates were highest during the decade of the 1960s (3.8 percent) and lowest over the first four years of the 1990s (1.5 percent).[12]

Table 1
ECONOMIC GROWTH FORECASTS

SOURCE	YEARS	FORECAST
Annual Energy Outlook 1995	1990-2010	1.8-2.7%
Council of Economic Advisors	1990-1999	2.4%
Data Resources Inc.	1993-2010	1.7-2.8%
WEFA	1993-2010	2.0-2.9%

Source: *Annual Energy Outlook 1995*, p. 6.

Goal 2

SUSTAINABLE ENERGY

Improve the economic and environmental performance of U.S. energy supply and use, while ensuring that all Americans have access to affordable energy services and increasing the competitiveness of American business

Indicators of Progress

- **Energy Efficiency:** Reduce average energy consumed per dollar of economic development from 1990 levels by 10 percent by 2000, 30 percent by 2010, and 50 percent by 2025 (primary energy per unit of real Gross Domestic Product (GDP).[13]

- **Renewable Energy:** Increase the share of renewable energy in the U.S. energy supply from the 1990 level

of 7.4 percent to 12 percent in 2010 and 25 percent in 2025.[14]

- **Efficient Electricity:** Increase average efficiency of electricity generated from fossil fuels to 40 percent by 2010 and 50 percent by 2025.[15]

Rationale

The energy intensity of the economy (energy consumed per dollar GDP) is a fundamental measure of sustainability that combines both technological efficiency (energy consumed per unit of goods and services provided) and the weighted mix of energy-using activities that make up the national economy.

- Despite the progress made in the past 25 years and the potential contributions of laws enacted but not yet fully implemented, many existing patterns of energy production and consumption deplete natural resources, degrade ecosystems, and create significant amounts of solid waste, water pollution, and atmospheric pollution.
- Energy efficiency and waste generation are linked. Pollution and waste are inefficiencies. More efficient industrial processes and technologies will increase productivity and produce less waste and pollution.
- Cost-effective approaches to increase end-use efficiencies will have benefits in all three dimensions of sustainability:
    - Reducing energy costs to consumers provides equity benefits
    - Reduced energy costs for manufacturers benefits the economy, thereby increasing international competitiveness. By lowering waste production, increased efficiency also leads to lower regulatory compliance costs
    - Increased efficiencies translate into fewer environmental impacts from pollution and waste.

Context: Energy Efficiency

- Reduce average energy consumed per dollar of economic development from 1990 levels by 10 percent by 2000, 30 percent by 2010, and 50 percent by 2025 (primary energy per unit of real Gross Domestic Product (GDP).

The energy intensity of the economy (energy consumed per dollar of GDP) is a fundamental measure of sustainability that combines both technological efficiency (energy consumed per unit of service provided) and the mix of energy-using activities that make up the national economy. Both of these components tend to reduce energy intensity as the economy evolves.

Historical Data

Primary energy use per dollar of real GDP fell by 19 percent from 1980 to 1993; and by two percent between 1990 and 1993.[17] Over the period from 1980-1993, energy use rose 18 percent in the residential and commercial sector; one percent in the industrial sector; 16 percent in the transportation sector, and 11 percent overall. Real GDP rose 36 percent.[18]

Forecast

For 1990 to 2000, the *Annual Energy Outlook 1995* forecasts a 5.6-8.1 percent decline in primary energy use per dollar of real GDP (see table 2). Energy use is predicted to rise 12-16 percent in the residential and commercial sector; 17-22 percent in the industrial sector; 13-17 percent in the transportation sector, and 14-19 percent overall. Real GDP rises 21-29 percent. For 1990 to 2010, the *Annual Energy Outlook 1995* forecasts a 13.9-18.6 percent decline in primary energy use per dollar of real GDP Energy use is predicted to rise 17-27 percent in the residential and commercial sector; 27-40 percent in the industrial sector; 23-33 percent in the transportation sector and 22-33 percent overall. Real GDP rises 42-64 percent. For 1990 to 2010, *Alternative Energy Future* forecasts an economy- wide decline of 30 percent in primary energy use per dollar of real GNP; a 25 percent decline in energy use per household in the residential sector; an 11 percent decline in energy use in the commercial sector per dollar of real GNP (total); and a 25 percent decline in energy use per dollar of industrial output, assuming adoption of their policy recommendations.

Table 2 ENERGY USE FORECASTS							
SOURCE	YEAR	PRIMARY ENERGY	RESIDENTIAL & COMMERCIAL	INDUSTRIAL	TRANSPORT	OVERALL	REAL GDP
Annual Energy Outlook 1995	1990-2000	-5.6-8.1%	+12-16%	+17-22%	+13-17%	+14-19%	+21-29%
Annual Energy Outlook 1995	1990-2010	-13.9-18.6%	+17-27%	+27-40%	+23-33%	+22-33%	+42-64%
Alternative Energy Future*	1990-2010	-30%	-25% and -11%*	-25%	--	--	--

** Per dollar of real gross domestic product. The Alternative Energy Future forecasts assume adoption of the policies recommended in that report.*

Source: *Annual Energy Outlook 1995*, p. 100, table B2, and p. 122, table B 19 (For 2000 and 20 1 0 forecasts); U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 1993* (Washington, D.C., 1994), p. 17, table 1.7 (for 1990 data).

Although the Task Force's energy intensity indicator level exceeds long-term historical rates by a significant amount, it is not without precedent: the energy intensity of the economy fell by 2.0 percent per year between 1974 and 1986, a time of rising real energy prices and new regulation aimed at increasing energy efficiency.[19] These indicator values are technically feasible and could be economically beneficial if energy and transportation policies, including research and development, are structured properly.

The 30 percent improvement by 2010 is nearly identical to the Energy Policy Act directive (30 percent improvement over 1988 levels) that guides the development of the Department of Energy's Least Cost Energy Strategy study.[20] It is significantly higher than baseline forecasts, which tend to be in the 15-20 percent range. The base case forecast for America's Energy Choices yielded a 24 percent improvement.[21] Few energy forecasts extend to 2025. The 1991 National Energy Strategy projected that the economy would be 32-41 percent more energy efficient in 2030 than in 1990, making the 2025 level of 50 percent improvement in the energy/GDP ratio appear to be a significant stretch but probably feasible.[22]

In addition to energy market forecasts, "bottom-up" technology analysis conducted in the last decade shows that more widespread adoption of existing energy efficiency technology could reduce energy demand by 25-45 percent--implying that a 50 percent aggregate reduction in the economy would be possible through diffusion of improved technology and the shifting composition of economic output to less energy-intensive products and services.[23]

Assuming a 2.5 percent average annual growth rate in the economy between 1990 and 2025, over-all primary energy use would be slightly higher than current levels by 2030 even if the efficiency indicator level is achieved. If other measures of progress are reached--for example in renewable energy and fossil generation efficiency--and if environmental technologies continue to reduce many of the pollutants associated with conventional energy supplies, then the overall environmental impact of this level of consumption could be significantly less than today's. Assuming that technologies improve and that rational policies are used to achieve the target, the economics could be distinctly favorable on a nationwide basis.

Context: Renewable Energy

- Increasing the share of renewable energy in the US energy supply from the 1990 level of 7.4 percent to 12 percent in 2010 and 25 percent in 2025.

Renewable energy sources typically have fewer environmental impacts than do fossil fuels and have significant domestic and international market potential. Costs have declined significantly for renewable energy technologies over the past 15 years. Continued cost reductions at historical rates will encourage significant market penetration, and expanded markets will encourage further cost reductions. These trends

will enhance the affordability of increasing the renewable energy share. However, barriers besides costs exist and these may need to be addressed in order to attain the indicator level. Because the share of hydropower is expected to remain constant, it is not included in the indicator values.[24]

Historical Data

Renewable energy consumption, including hydroelectric power, was 7.4% of total U.S. energy consumption in 1990. Hydroelectric power accounted for 3.7% of total US. primary energy consumption in 1990.[25]

Forecasts

The Annual Energy Outlook 1995 forecasts renewable energy consumption, including hydroelectric power, will be 8.3 -8.8 percent of total U S. primary energy consumption by 20 1 0. Hydroelectric power will account for 3.0 percent (high and low estimates the same) of total US. primary energy consumption by 2010. Of the remaining 5.2-5.7 percent of total US. primary energy consumption coming from renewable energy, 1.6-2.0 percent will be used by electricity generating utilities and non-utilities, 1.0 percent (high and low estimates the same) will be used by cogenerators, and 2.8-2.9 percent will be used for non-electric renewable energy consumption. Biomass and other wastes equal approximately one percent of total US. primary energy consumption in both high and low estimates.16 Data Resources Incorporated forecasts that 3 5 'gigawatts of 1993 generating plant capacity will be retired by 2010 and 110 gigawatts by 2015.[27]

The Annual Energy Outlook 1995 baseline projections suggest that the Task Force's target of 12 percent in 2010 and 25 percent in 2025 would require concerted policy efforts if they are to be achieved cost-effectively. Interaction with the energy efficiency targets could work either way: reduced energy consumption would increase the percentage contribution of any given level of renewable energy, but slow growth in electric generating capacity could also blunt the market for renewable generating technologies.

Context: Efficient Electricity Generation

- Increase average efficiency of electricity generated from fossil fuels to 40 percent by 2010 and 50 percent by 2025.

Improvements in fossil energy technologies, including transmission and distribution, will improve the efficiency of electricity supply and reduce its environmental impact. Current average efficiency m providing electricity (end-use electricity consumed divided by energy input, including transmission and distribution losses) is 32 percent, which is assumed to remain constant through 2010 under current projections.[28]

Historical Data

Average generating efficiency of utilities (BTUs per kilowatt hour generated divided by 3412) was 32 percent in 1980, 32.5 percent in 1990, and 33 percent in 1993.[29] Transmission and distribution losses for utilities currently equal around 10 percent of generated kilowatt hours of electricity.[30]

Forecasts

The *Annual Energy Outlook 1995* forecasts an average generating efficiency for utilities and non-utilities by 2010 of 33.1-33.3 percent. [31] The *Annual Energy Outlook 1995* forecasts 113-176 gigawatts in gross additions to the electricity generating capability of utilities, non-utilities, and cogenerators between 1990 and 2010. It also forecasts retirement of 60 gigawatts of generating capability from 1990 to 2010 (high and low forecasts the same, all retirements occur in utilities). Total generating capability of utilities, non-utilities, and co-generators by 2010 is forecast to be 800-863 gigawatts.[32]

New electricity generation technology is already capable of yielding much higher efficiencies than the current system average. For example, thermal efficiencies in some new natural gas-direct combined-cycle units are over 50 percent (not including transmission and distribution losses). (See table 3.)

Table 3
AVERAGE EFFICIENCY OF ELECTRICITY GENERATION TECHNOLOGIES

	Steam Turbine		Combined Cycle	
	Oil & Gas	Coal	Oil & Gas	Coal
Best available technology in 1993	35.5%	33.5%	45.1%	40.0%
Expected best available technology in 2002	N/A	42.0%	55.0%	50.0%

Source: U.S. Department of Energy, Fossil Energy Office, Memorandum from FE-4 to PO-62, 27 February 1995.

The U.S. Department of Energy research and development goals for coal-based technology are 55 percent thermal efficiency by 2010 while keeping costs at or below current levels. This is based on gasification/fuel cell technology. Higher overall efficiencies would be possible with maximum waste-heat recovery in some applications--perhaps as high as 65 percent by 2025.

However, capital stock turnover is slow in the electricity generation sector, and increased energy efficiency will further reduce new capacity needs. The Task Force targets in this indicator assume a substantial increase in both the efficiency

of new units and a sharp acceleration of projected replacement investment. Therefore, the levels of this indicator are a significant stretch. For example, the 2010 target could be met if roughly 40 percent of capacity averaged about 55 percent efficiency while 60 percent of capacity maintained the current average of 32 percent. But current projections indicate that, without policy changes, almost all of existing capacity will remain in operation in 2010 and that capacity installed between 1990 and 20 1 0 will not significantly increase the current average system efficiency. The year 2025 target could be met if three quarters of the capacity operated at 55 percent efficiency, assuming that the remainder operated at the current system average of 32 percent. Again, projections of utility stock turnover raise significant questions about the feasibility of this indicator level without a significant policy effort.

Goal 3

SUSTAINABLE TRANSPORTATION

Improve the economic and environmental performance of the U.S. transportation system while increasing all Americans' access to meaningful jobs, services, and recreation.

Indicators of Progress

Many aspects of the transportation system are defined and measurable. However, further work is needed on measures for some important areas.

- National and Economic Security: Steadily reduce dependence and suburban areas.
- Traffic Congestion: Steadily decrease congestion in urban and suburban areas.
- Transportation Efficiency: Reduce average greenhouse gas emissions per passenger-mile by [x]* percent and ton-mile by 20 percent by 201 0 and by 40 percent by 2025, while maintaining or enhancing the projected downward trend in other pollutants.[33]
- Reducing the Need to Travel with Increased Access: Stabilize average vehicle miles traveled per capita at 1990 levels by 2010 while enhancing the desirability of alternatives to single occupancy driving.[34]
- Increasing Access: Improve the rural and urban accessibility of jobs, markets, services, and recreation and thereby increasing the share of trips made by alternatives to personal motor vehicles to 30 percent by 2025.[35]

** The Task Force members agreed to defer to the significantly greater analytical resources available to the Presidential Advisory Group on Greenhouse Gas Emissions from Personal Motor Vehicles. Although this group completed its work without issuing a consensus final report, policymakers can refer to the advisory group's docket to review the analytical work and discussion regarding the appropriate level for the passenger-mile components of this indicator.*

Rationale

Transportation systems spur economic and social development by linking producers with suppliers and markets and by connecting people to employment opportunities, goods, services and recreation.

- Reducing petroleum imports would strengthen US economic and national security. Roughly two-thirds of the petroleum consumed in the United States is used for transportation. Petroleum imports are rising and currently account for 44 percent of U.S. consumption--a quarter of it from nations in the politically unstable Persian Gulf region.[36]
- Traffic congestion puts a high economic burden on society - accidents, wasted time, excessive fuel consumption, additional pollution per mile traveled. Further, congestion is increasing rapidly in most urban and suburban areas.[37]
- Pollution is a symptom of inefficiencies. The development and application of more efficient transportation technologies and more efficient modes will reduce the economic and environmental costs of air emissions and wasted fuel.
- Better designed community transportation systems and affordable alternatives can reduce the need for travel by single-occupancy driving - the most inefficient means of traveling.
- Convenient, affordable, reliable regional and public transit will better enable people to reach employment opportunities, goods and services, and recreation.

Context: National and Economic Security

- Steadily reduce dependence on oil imports

Because of reduced domestic exploration, dwindling reserves, falling production, and the relatively high cost of U.S. production, oil imports have grown from 37 percent of domestic consumption in 1987 to 44 percent in 1994. Motor vehicles account for approximately two-thirds of all domestic

oil consumption and are therefore the major force behind this rising demand.[38] In the short-term, imports on balance help the economy through lower prices for fuels, reduced inflation, a rise in real disposable income, and overall economic growth. However, the immediate benefits of imported petroleum come with longer term economic and national security costs as well.

According to the Department of Commerce, substantial reliance on petroleum imports threatens to impair national security. Although U.S. energy security has improved in recent years with the breakup of the Soviet Union and the apparent disarray within the Organization of Petroleum Exporting Countries (OPEC), political and economic problems in the Persian Gulf region make supply disruptions a possibility. Persian Gulf oil has risen to 21 percent of domestic imports and the United States and the Organization for Economic Cooperation and Development (OECD) countries have limited options to offset another major oil supply disruption because: (1) there is little surplus production outside the Persian Gulf, (2) U.S. and OECD government oil stocks provide less protection from an interruption than in the past; and, (3) alternative fuels and electric vehicles would not be able to meet the sudden increase in demand.[39] During a major oil supply disruption, there could be substantial hardships for the U.S. economy--caused by inflation, unemployment, and income and productivity losses. Since the post-World War II period, significant supply disruptions have occurred 11 times, three times with major economic implications--the 1973 Arab oil embargo, the Iranian Revolution (1978-80), and the Iraqi invasion of Kuwait in 1990.[40] To protect the Middle East and access to oil, the U.S. maintains a significant and costly military presence in the Persian Gulf.

Economic and national security risks can be expected to increase as U.S. oil imports continue to grow because of declining domestic production and increased economic growth. The Energy Information Administration of the U.S. Department of Energy (EIA/DOE) projects that net imports will increase to 51.5 percent of domestic consumption by 2000 and that the United States and its allies will become increasingly dependent on Persian Gulf oil, which will account for 55 percent of world exports by 2000.[43]

Historical Data

Net oil imports as a share of U.S. petroleum products have been rising since 1985. The 1994 level of 45 percent is near the historic high of 46.5 percent in 1977.[42] Gross imports of crude oil surpassed domestic production during several months of 1994.[43] Since 1980, the value of oil imports has fallen both as a share of the total value of imports and as a share of GDP, reaching eight percent of all imports and less than one percent of GDP in 1994.[44]

Forecasts

As a result of both increasing demand and declining domestic production, net oil imports are forecast by *Annual Energy Outlook 1995* to reach 58-59 percent of oil supplied in 2010.[45] Because the world oil price (in 1993 dollars) is expected to rise in the EIA/DOE Reference Case about 50 percent from 1993 to 2010 and a greater share of imports is expected to be finished products, the value of oil imports as a share of GDP is expected to increase from 0.7 percent in 1994 to 1.6 percent in 2010.[46]

Table 4
HISTORICAL AND FORECASTED LEVELS OF CARBON EMISSIONS FROM TRANSPORTATION

POUNDS PER 100 PASSENGER MILES				POUNDS PER 100 TON MILES			
	1980	1990	2000		1980	1990	2000
				Trucks	12	15	12
				Domestic Shipping	2	2	2
Light Duty Vehicles	19	17	15	Rail Freight	3	3	2

Source: U.S. Department of Energy, Energy Information Administration, *Supplement to the Annual Energy Outlook 1995* (Washington, D.C., 1995), tables 1, 32, 47, 52 and 53; *Transportation Energy Data Book: Edition 13* (Washington, D.C., 1993), tables 2.12 and 2.14.

** The Task Force members agreed to defer to the significantly greater analytical resources available to the Presidential Advisory Group on Greenhouse Gas Emissions from Personal Motor Vehicles. Although this group completed its work without issuing a consensus final report, policymakers can refer to the advisory group's docket to review the analytical work and discussion regarding the appropriate level for the passenger-mile components of this indicator.*

Context: Efficient Transportation

- Reducing average greenhouse gas emissions per passenger-mile by [x]* percent, and ton-mile by 20 percent in 2010 and by 40 percent by 2025, while maintaining or enhancing the projected downward trend in other pollutants.

Emissions of greenhouse gases are an important concern and transportation emissions are growing significantly. A wide range of policies can contribute to attaining the Task Force's indicator levels, including increasing the energy efficiency of vehicles, encouraging use of alternative modes of transportation, increasing vehicle occupancy or load factors, or making use of alternative technologies and fuels. Where alternative fuels could contribute to attaining the indicator levels, full fuel cycle impacts of alternative technologies or fuels should be taken into account to accurately measure their potential contributions to the target. Economic and equity considerations should emphasize policies that enhance the affordability of and access to transportation services.

Historical Data

Due to the combined effects of deregulation and increased speed limits, carbon emissions from freight trucks rose from 12 lbs per 100 ton miles in 1980 to 15 lbs per 100 ton miles in 1990. However, recent evidence suggests emissions per ton mile will decline as excess capacity in the industry is reduced. Carbon emissions from domestic shipping (water) and rail freight were the same in 1980 as in 1990 (two lbs and three lbs per 100 ton miles respectively.) (See table 4.)

Forecasts

The *Annual Energy Outlook 1995* Supplement Reference Case forecasts by the year 2000, carbon emissions from light duty vehicles will be 15 lbs per 100 passenger miles. Carbon emissions from trucks will be 12 lbs per 100 ton miles. Emissions from both domestic shipping and rail freight will be two lbs per 100 passenger miles each. (See table 4.)

Because the transportation system is characterized by large fixed investments, slow capital stock turnover and limited opportunity to alter behavior in the short term, no indicator level has been set for the year 2000. In particular, because automobile production plans for the year 2000 are set, any near-term progress toward these indicator levels could only be achieved primarily through shifts in the mode of transportation used, increased vehicle occupancy or load factors, and perhaps increased use of alternative fuels.

There is considerably more opportunity to reduce emissions in the next 15 years through a combination of behavioral factors and technological market shifts, including a small penetration of "New Generation" technologies. The *Annual Energy Outlook 1994* projects that on-road vehicle efficiencies will increase 14 percent between 1990 and 2010. [47] However, continued erosion of occupancy or load factors may reduce the benefits from this change. Thus, obtaining significant improvement in emissions per mile could still require a combination of technology improvements and behavioral shifts.

The year 2025 indicator represents a substantial penetration of "New Generation Vehicles" in the personal transportation fleet along with other policies that would decrease emissions in the freight sector.

Context: Traffic Congestion

- Steadily decrease congestion in urban and suburban areas.

Congestion puts a high economic burden on society--accidents, wasted time, excessive fuel consumption, and additional pollution per mile traveled. Further, congestion is increasing rapidly in most urban and suburban areas. A measure commonly employed by the National Highway Administration to gauge the driving conditions on major urban highways is the volume to capacity ratio. Moderate congestion is defined as a volume-to-capacity ratio of 0.7 or above, with severely congested conditions defined as volume-to-capacity over 0.95 (that is bumper-to-bumper. Over 50 percent of urban highway travel occurs in moderately congested conditions, a figure that is projected to increase to 80 percent in 2000. Reducing the growth in vehicle miles traveled per capita and increasing access to jobs, goods, and services and recreation by alternatives to personal motor transportation (the next two indicators) will probably have a significant impact on congestion.[48]

Historical Data

Between 1983 and 1990, the number of daily vehicle trips per household grew from 4.1 to 4.7. The average length of these trips increased from 7.9 to 8.9 miles.50 The Roadway Congestion Index (developed by the Texas Transportation Institute for 50 urban areas nationwide) shows that from 1982 to 1990 cities with the greatest population density had the most congestion and the greatest increases in congestion; [47] of the 50 cities experienced congestion increases.[51] Traffic congestion in 1990 was also measured as costing, on average, 200,000 hours of delay and $860 million in fuel costs and delay time.[52]

Forecast

By 1999 at least half of vehicle miles traveled are expected to occur in bumper-to-bumper traffic--compared to 31 percent in 1989--and almost four-fifths of urban interstate travel will be in severely congested traffic - compared to 53 percent in 1989.[53] In 1990, 11 billion hours were spent in traffic congestion.[54] While this represents only a small fraction of the

total time spent in travel, it has significant economic impacts especially in the most congested areas.[55]

Context: Reducing the Need to Travel while Improving Accessibility

- Stabilize average vehicle miles traveled per capita at 1990 levels by 2010 while enhancing the desirability of alternatives to-single-occupancy driving.

Historical Data

Average vehicle miles traveled per capita in light duty vehicles (personal cars and trucks) rose 25 percent between 1980 and 1991.[56] The average vehicle occupancy during all trips in 1990 was 1.6 persons. However, occupancy was lowest (1.1) for work trips and highest (2.1) for social/recreational trips. Occupancy rates for social/recreational trips remained the same between 1983 and 1990 but fell from 1.3 to 1.1 persons for home-to-work trips.[57] The number of passengers carried by the transit industry remained approximately the same (8.5-8.6 billion) between 1980 and 1992, with small declines in bus transit and small increases in rail transit.[58]

Forecasts

The *Annual Energy Outlook 1995* Supplemental Reference Case forecasts a further increase of about 25 percent in vehicle miles traveled per-capita (in light duty vehicles) between 1990 and 2010.[59] The estimates are a function of the cost of driving per mile, income per capita, ratio of female to male vehicle miles traveled, and age distribution of the driving population.[60] The slower growth in vehicle miles traveled relative to earlier periods occurs because of slower growth of the driving-age population and demographic aging trends. Some have questioned whether the increased growth in vehicle miles traveled over the past ten years can be expected to continue and attribute the increase to relatively faster growth in driving-age population and changes in demographic trends.

Stabilizing vehicle miles traveled could require significant changes in land use, transportation infrastructure, mass transit, and commuting patterns. The Task Force's indicator is very aggressive relative to current trends, as vehicle miles traveled have been increasing by over by percent per year and vehicle miles traveled per capita have been increasing over two percent per year.[61] Nevertheless, recent statutes such as the Intermodal Surface Transportation Efficiency Act and the Clean Air Act Amendments of 1990 as well as state efforts have begun to focus on reducing the growth in transportation demand.[62] For example, the state of Oregon requires planning in urban areas to attempt to reach goals similar to this target. The Task Force is particularly concerned that the attainment of this indicator be reached by providing alternatives that enhance affordable access to jobs, services, and recreation for low income people. Alternatives to single occupancy driving include: increasing passengers in a personal vehicle, using public transport, trains, or planes, walking, bicycling, and other transport.

Projections of vehicle miles traveled in 2025 vary by over 50 percent, depending on demographic and other factors. Forecasts of policy responses also vary. For example, reputable estimates of the price elasticity of vehicle miles traveled to gasoline prices can vary substantially, depending on the magnitude of price changes and the time horizon for behavioral and technology adjustments.

Context: Improving Accessibility

- Improve the rural and urban accessibility of jobs, markets, services, and recreation and thereby increase the share of trips made by alternatives to personal motor vehicles to 30 percent by 2025.

Historic Data

In 1990, 87 percent of all personal trips were made by private vehicles, seven percent by walking, two percent by school buses, two percent by public transportation, one percent by bicycles, and the rest by Amtrak, planes, taxis, and other means.[63] For persons who lived outside metropolitan areas, 89.4 percent of all trips were made by personal vehicles, 0.5 percent were made by public transport, 5.6 percent were made by walking and the rest by other means.[64] In 1990, 62 percent of all trips were five miles or less. Of these, 82.8 percent were made by private vehicles, 11.5 percent by walking, 2.6 percent by school bus, 1.5 percent by public transport, and 1.0 percent by bicycle.[65] The purposes of trips in 1990 were family and personal (42 percent), social and recreational (25 percent), earning a living (22 percent), civic, educational, and religious (10 percent), and other (1 percent).[66]

Forecasts

The number of conventional corporate employees who telecommute rose from 2.4 million in 1990 to 6.6 million in 1994, according to Link Resources and Find/SVP. Find/SVP estimates that the figures will climb to 11 million by 2000. If contract workers are included, all of these numbers will rise by 25-30 percent.[67] A 1991 Harris Poll showed that 23 percent of U.S. adults would sometimes commute to work by bicycle if

safe bicycle lanes or paths were available. Three out of six adults said they would walk more if there were safe paths or walkways. Five percent of adults reported walking or bicycling as their primary means of transportation; but given adequate facilities, 13 percent would prefer to meet their transportation needs by walking or bicycling.[68] If the United States were to make a concerted effort, it would stand a good chance of substantially improving overall travel efficiency, and reducing the volume of travel that would otherwise be achieved."[69]

CHAPTER 3
POLICY RECOMMENDATIONS

After recommending goals to the Council, the Energy & Transportation Task Force members worked to develop policy recommendations intended to provide economic, environmental, and equity benefits, in varying degrees. Many of these recommendations are targeted to help achieve specific indicators of progress that are presented in the previous chapter.

The Task Force strove to develop policy recommendations that operate within the context of competitive markets, promote overall prosperity, and offer consumers a wide range of choices. Some of these recommendations offer incentives for providers of energy and transportation services to improve environmental performance while maintaining affordability. Others strive to remove regulatory or institutional barriers to economic, environmental, and social equity goals. Table lists each policy recommendation and indicates whether it would operate through market mechanisms, whether it would entail programmatic or institutional changes, or whether changes in regulations would be required for implementation.

Table 5

Policy Recommendation	Policy Approach		
	Market Mechanism	Programmatic/Institutional Changes	Regulatory Change
1. Incentives for Sustainable Electricity Generation/td>	*		
2. National Energy-Efficiency Offer	*		
3. Revenue Neutral Tax Shift to Help Achieve Sustainable Development	*		
4. Regulatory Flexibility	*		*
5. Local Authority for Market-Based Regional Congestion Management	*		
6. Location-Efficient Mortgages	*	*	
7. Cash for Clunkers and Inspection and Maintenance	*	*	
8. Building on Current Successes	*	*	*

POLICY RECOMMENDATION 1

Incentives for Sustainable Electricity

Tax incentives should be provided for U.S. electric generators to replace the most inefficient infrastructure in energy conservation and a mixture of new, efficient fossil and renewable electricity generation technologies by the year 2010

Target Indicators

- *Energy Efficiency*
- *Renewable Energy*
- *Efficient Electricity*

Background

Technology is both a cause of and part of the solution to many of the barriers on the path to a sustainable future. It is important to focus not only on how fast new technologies that use resources more efficiently and prevent pollution are developed, but also on how quickly these new, cleaner technologies are moved off the shelf and into everyday use. From the light bulb to the power plant, there are tremendous opportunities to replace old technologies while creating jobs, reducing environ-mental impacts, and stabilizing long-term electric rates. According to industry projections, by the year 2000 roughly 20 percent of the U.S. electricity supply will be generated by plants 40 years of age and older.70 Typically, these facilities use generation technologies that are significantly less efficient than those available and in use today.*

** Older facilities have efficiencies - energy i.input to heat output - ranging from 25-32 percent as compared to the 40-50 percent efficiencies of technologies available today.*

Table 6 AGE OF FOSSIL FUEL ELECTRIC CAPACITY IN THE YEAR 2000			
FUEL TYPE	**ALL AGES**	**+30 YEARS**	**+40 YEARS**
Coal	284.3 GW	112 GW (39.4%)	46.9 GW (16.5%)
Oil & Gas	144.8 GW	85.6 GW (59.0%)	34.4 GW (23.8%)
TOTAL	**429.1 GW**	**197.6 GW (46%)**	**81.3 GW (18.9%)**

Although plants built before 1960 are much less efficient than the best current technologies, some utilities are not retiring them because they are valuable as backups and during times of high demand in summer and winter months. As the utility generating stock ages, some plant retirements will occur naturally and lead to replacement investments in renewable and more efficient fossil generation technologies. However, industry projections suggest that few units will be retired between the year 2000 and 2010, and only 35-60 gigawatts (GW) of generation capacity are scheduled to retire by 2015. At most, only slightly more than half of the total plant capacity 40 years or older in the year 2000 will be retired by 2015.[71] This would leave a significant number of the most Inefficient power plants in operation and contributing the most emissions to the environment.

Policy Overview

Tax code changes, as well as tax reform measures, could be provided to remove barriers and create incentives to move toward specific goals for sustainable development. Tax depreciation schedules could be based on the characteristics of the technology, particularly in cases where the assets are long-lived. Reviews of federal tax and subsidy policy should consider this objective. Tax incentives should be provided for U.S. electric generators to replace the most inefficient infrastructure with investments in energy conservation and a mixture of new, efficient fossil and renewable generation technologies by the year 2010. Incentives should be linked to the efficiency of the new technologies and lead to retiring, repowering, or replacing approximately 400 GW of the most inefficient power plants. Task Force members are concerned about short-term electricity price increases that could result from retiring plants that generate low cost electricity. As a result, the rate and scope of the policy would need to be adjusted to prevent unreasonable utility rate and taxpayer impacts.

Possible Implementation Approaches

Tax incentives should be provided to utilities and other power plant owners that invest in a combination of conservation, renewable energy resources, and high efficiency fossil resources--those that have at least 50 percent energy input to heat output efficiency. To qualify, electricity generators would have to replace the most inefficient Restructure, agree to enter this program by January 1, 2000, and complete their conversion (meet targets) by January 1, 2010. In addition, all required regulatory approvals would need to be secured prior to receiving tax benefits. In exchange, the tax incentives could be taken between the date of entering the program and the year 2005. One mechanism that would potentially have significant impact would be to base accelerated depreciation tax benefits on the thermal efficiency of new fossil fuel fired investments, investments in renewable generation or improving the efficiency of end use.

Policy Duplications

This tax incentive can be viewed as a reinvestment in America. It develops an electrical power system for the future that is more efficient, cleaner and less costly in the long-ten-n, while creating new jobs and a more competitive industry. Shorter tax depreciation schedules for the most efficient replacement technologies would have two effects that could help achieve the goals: the decision to retire and rebuild would be accelerated, and the composition of new investment would be shifted toward the most efficient and renewable technologies.

Specifically, these incentives would promote several kinds of technologies that would contribute to economic, environmental, and equity goals. Investments in energy conservation technologies would have the most economic and environmental benefits by reducing the need for electricity. This program would increase the use of technologies that rely on the abundance of U.S. renewable energy resources. Renewables generally have fewer environmental impacts than fossil fuels, and they are gradually becoming commercially competitive with traditional power sources. Since fossil fuels will continue to be an important energy source in the future--at home and abroad--incentives would encourage greater use of cost-effective technologies available today that bum fossil fuels cleaner and more efficiently. As a result the air, water, and soil pollution associated with energy use would be reduced at lower cost.

Reward Only the Most Efficient Technologies

The incentives would be limited to investments in conservation, renewables, and high-efficiency fossil technologies. The high minimum efficiency standard for replacement fossil technologies is greater than the projected average efficiency of new investments that would occur without the incentive. Using this standard would reward investments that make the greatest contribution and helps to limit windfall tax advantages to investments that would have occurred without the incentive. This policy would also lower the costs of capital for emerging technologies that will be essential to a sustainable energy supply. The Task Force recognizes that economic and national security concerns require a diverse portfolio of fuels and electricity generation technologies in the U.S. energy supply. Therefore, program requirements are designed to be fuel neutral.*

> **In addition to natural gas technologies that already feature efficiencies of 50 percent, two coal technologies with similar conversion efficiencies are expected to be in commercial operation by the year 2010. These technologies are advanced integrated gasification combined cycle and pressurized fluidized bed.*

Costs Impacts

Cost impacts for energy consumers would depend on the specific design of the program and the regulatory structure of the electricity market in each state. However, an upper bound could be considered if all generation capacity 40 years and older is replaced sooner than what otherwise occur. Assuming all 40-year-old capacity is replaced in the year 2000 instead of 2010, an additional cost of $8 to $11 billion would occur, but may be offset over time by lower fuel expenses. Electricity sales currently exceed $200 billion per year nationwide.[72] Because the program would be voluntary, the ultimate impact on electricity rates should be minimal, and would depend on the level of tax subsidy, the magnitude of ongoing fuel savings, and the regulatory treatment of capital costs.

Long term rates are likely to stabilize as the newer plants reduce the risk of future rate shocks due to fuel prices, operating and maintenance cost overruns or regulatory changes arising from growing health concerns. The actual effects on consumers will vary according to region, the cost structure of the state regulators treat underpreciated assets for rate making purposes. The rate and scope of the policy may need to be adjusted to prevent unreasonable utility rate increases and costs to taxpayers. The recommendation does not address the regulatory treatment of investments at the local level.

Tax consequences depend on how targeted the program is and how much "free riders" gain benefits on investments that would have occurred without the benefit. Revenue loss could be several billion dollars per year, but program design could limit windfall gains and federal revenue losses.[73] A one-time increase in investment activity could generate some compensating tax revenues, but this impact is not universally accepted.

Key Trade-Offs and Considerations

Positive--This policy recommendation would provide a "market pull" to stimulate demand for efficient and renewable technologies, accelerating investments in technology development and cost cutting manufacturing innovations to speed commercialization of new technologies. Greater use of cleaner technologies would result in significant environmental improvement--reduced air and water emissions and also fewer local impacts from fuel production and transportation.

Negative--This policy recommendation would not be revenue neutral at the federal level. The impact on short term electricity rates could be negative if new investments are not managed properly. There is also a "free ride' issue in that some of these investments might occur without these incentives. The short-term costs to energy consumers and taxpayers are important issues that need to be considered in determining the scope of the policy and the pace of its implementation.

POLICY RECOMMENDATION 2

National Energy Efficiency Offer

A program should be developed to replace the existing patchwork of utility-sponsored conservation programs with state Energy Efficiency Funds that use a competitive market mechanism to purchase energy savings.

Target Indicators

- Energy Efficiency

Background

Energy efficiency is a primary tool of sustainability because it can help achieve the interdependent objectives of improving the economy, increasing equity, and reducing environmental costs. Energy-efficient buildings and products reduce energy

bills for consumers, which can improve social fairness. Efficient manufacturing reduces energy and environmental compliance costs and puts U.S. firms in a better competitive position in international markets. Energy efficiency reduces the environmental impact of homes, jobs, and goods and services consumers enjoy. A recent study demonstrates that a 30 percent reduction in overall energy use would save U.S. electricity customers $50 billion, while significantly reducing environmental emissions. These savings would lead to $45 billion in economic growth. In fact, much of the economic growth of the past 20 years has been powered not so much by building new power plants but by redesigning energy consuming industrial processes and rethinking how products are made and used. Utilities have undertaken an entire class of investment, known as demand-side management to displace new generation and transmission. These include, for example, "weatherizing" homes and buildings, using power when demand is low, and upgrading the efficiency of equipment, such as appliances, lighting, and industrial motors.74

Despite the substantial efficiency gains of the past 20 years, consumers and industry can still save energy cost-effectively by using newer technologies and improved practices. Many of the least affluent in society have not yet reaped the economic gains from energy efficiency because of lack of financial resources and access to technology. And because of the toll current patterns of energy production exact on the environment, energy efficiency can directly improve environmental conditions.

Over the past two decades, energy markets have become more competitive and direct government influence has waned. This is an evolution that has brought significant benefits for consumers and contributed to more efficient energy use. However, electric power has been bought and sold in monopoly markets that evolved before the benefits of conservation were known. These monopoly markets give incentives to supply more and more energy, instead of incentives to first look for "smarter" ways to use energy. Electricity markets are currently moving from regulated monopolies toward competitive markets. However, this transition to increased competition needs to be managed with efficiency and the environment in mind. Specifically, many analysts question whether even the best demand-side management programs currently in place will survive the transition to more competitive markets.[75] Although energy efficiency investments are less expensive in the long-term, many utilities fear they will be at a disadvantage in the short term if their competitors do not provide these incentives too. Also unclear is the extent to which businesses will take advantage of opportunities in this area and might create innovative approaches to replace traditional demand-side conservation programs. Energy efficiency should continue to be emphasized during the period of transition and beyond.

Clearly, given the present trend toward competition in the electric utility industry, transitional programs and policies must promote a market-based delivery system if they are to survive. They must be designed to enhance, rather than detract from, the competitiveness of those who participate in their implementation. The National Energy Efficiency Offer policy recommendation is designed to operate in any model of broad competition that may emerge in electricity markets. The benefits of open competition can help foster a vibrant market in energy efficiency through a program which: (1) is implemented at the state level; (2) enables states to opt-out by enacting their own laws; (3) recovers incentive payments through the distribution system, creating a level playing field for all supply-side sources; and (4) remains in place for only seven years.

Policy Overview

To achieve a sustainable future in the generation and consumption of power, energy efficiency, must be a national objective. The President should encourage states to provide incentives for energy-efficiency investments until these investments can be maintained by competitive energy markets. A program should be developed to replace the existing patchwork of utility-sponsored conservation programs with state Energy Efficiency Funds that use a competitive market mechanism to purchase energy savings. The federal executive branch should consult with states and their utilities and consumers to determine whether this policy recommendation should be executed through national legislation that allows states to "opt out" through their own laws or through a voluntary pilot program that gives states the opportunity to determine if they want to develop a program based on this model. This determination should be made within twelve months.

If implementation is to be through national legislation, the executive branch should prepare and provide to Congress proposed legislation that would set up the broad energy efficiency outlines of this temporary program, and guide states in developing specific details of the program to be implemented at the state level.

State Opt In or Out

A pilot program would allow states to opt in, or federal legislation would provide that any state could opt out of the national program by enactment of state law.

Since the policy recommendation is intended to be temporary, designed to cover the period of transition from a regulated to more a competitive market, the federal legislation proposed would contain a seven-year "sunset" provision.*

> **Early indicators suggest that utilities preparing for competition are striving to cut costs and drive their own prices down. Even those utilities that have shown willingness in the past to include demand-side management programs, will only continue to do so voluntarily where the programs clearly enhance competitive advantage. A federally-encouraged transition-period program will serve two purposes: (1) continue improvement of price competitiveness of demand-side management measures through the market transformation effect of a "created" market,- and, (2) insulate new, reluctant and/or old participants fi-om real or perceived disadvantages of participating in the delivery of "expensive" services.*

It is clear that residential, commercial, and small manufacturing customers, for example, that do not already engage in extensive demand-side management efforts would benefit from a program of this type. However, many large facilities that may be subject to global competition already make significant investments in energy efficiency as a business mainstay. In these cases, incentive programs involving surcharges may not be warranted.

Possible Implementation Approaches

Assessment at the Meter Paid Into An Energy Efficiency Fund--In participating states, a fee would be assessed at the meter for all users of an electricity distribution system with 20,000 or more customers. The proceeds from each fee assessment would be placed in an Energy Efficiency Fund that would be administered as determined by each state.

Energy Efficiency Incentive Payments Made From An Energy Efficiency Fund

New firms, utilities, and others would compete for contracts to help residential and commercial consumers reduce their energy bills--and the demand for more energy. Each state Energy Efficiency Fund would be used to pay an incentive to purchase energy savings from qualified firms that provide efficiency services to end users. A utility, energy services company, or end user could qualify as a provider of efficiency services. Energy savings would be acquired through an open, competitive market mechanism. One such mechanism is structured as an Offer to Purchase Energy Efficiency at a particular price which will be determined by a state-designed administrative entity. This type of mechanism fosters a competitive market for the provision of energy efficiency services, since the Offer Program will establish the essential parameters of the "product"--ie. the energy efficiency measures or package to be delivered. Competition among these potential providers will work to create the most comprehensive and cost-effective energy efficiency investments and would be among the most cost effective ways to reduce the air, water, soil, and other pollution resulting from energy production and use.

A state-designated entity would administer the Fund to purchase energy efficiency services. The state-designated administrative entity could be a state utility regulatory authority or other agency, an electricity distribution company, a private, non-profit, or other organization, or another entity as determined by the state.

Any state with ongoing, market-based programs for the delivery of energy efficiency would be allowed to continue those programs and pay for them through the Energy Efficiency Fund as permitted by the appropriate state-designated administrative entity. The preexisting state energy efficiency program could be used either to supplement, or to supplant, the proposed program, provided that the program or combination of programs chosen promotes an open, competitive market for the delivery of energy efficiency services.

Energy Efficiency Payments Based on Measured Savings

Payments from the Energy Efficiency Fund would be based on measured savings in accordance with market-proven measurement and verification protocols (for example, those in effect in New Jersey and California). This will ensure that reductions in energy use are real and persistent, are cost-effective, and will enable energy efficiency investments to generate tradable air emissions credits.

All Other Details of the Policy Established at the State Level

Beyond the broad items discussed, all other details of the proposed Energy Efficiency Fund program would be established by the state legislature through implementing legislation, or by the state's designated administrative entity. Following are some of the implementation parameters states would determine:

- The price level or range of price levels to be paid to competitors from the fund for measured savings.
- The fee to be charged through the "non-bypassable" assessment at the meter, including any variations in the

level of assessment among rate classes deemed necessary in the interests of equity.*

- The amount of energy efficiency to be purchased from competitors using the Energy Efficiency Fund at any given time (for example, based on any existing state integrated resource planning process).

- Whether the incentive payment is made up front or over time;

- The parties who will be eligible to respond to the Energy Efficiency Fund offer--for example, utilities, energy services companies, and end users. This determination should include a decision on whether end users who undertook the installation of energy efficiency measures prior to enactment of the program will be eligible for the incentive payments Resolution of this question is important in order to ensure fairness among end users who also are competitors and to avoid the "free rider" problem.

- The minimum level of energy efficiency investments for which incentive payments will be available--for example, 100 kilowatts.

- Energy efficiency measures eligible to receive incentive payments.

** Due to their lack of economic resources, low income residential ratepayers tend to have low levels of participation in demand side management programs (DSM), which often require that participants share in a portion of the costs of DSM technologies and services. DSM programs can be designed to overcome these barriers so that low income users do not become defacto nonparticipants. The federal legislation should require that state programs be designed to assure participation by low income residents. Because the Energy Efficiency Fund is made tip of fees collected from all electricity users, these users will be contributing their pro-rata share, and must receive the benefit of their contribution.*

Macroeconomic Implications of the Policy Recommendation

A recent macroeconomic study demonstrates that by meeting the 2010 energy use reduction target of 30 percent, the U.S. will reduce annual electricity generation by 27 percent and decrease the need for construction of new generating facilities by over 50 percent. U.S. electricity customers will enjoy an 18 percent overall reduction in their electricity bill (a savings of $50 billion), while electric sector emissions of carbon dioxide and oxides of nitrogen will be reduced by 33 percent and 12 percent, respectively. These lower costs for energy will enable U.S. consumers to increase their annual consumption of other goods and services by $45 billion.[76]

POLICY RECOMMENDATION 3

Revenue Neutral Tax Shift to Help Achieve Sustainable Development

The Energy and Transportation Task Force recommended the Council debate this important topic. In wrestling with this concept on its own, the Energy and Transportation Task Force identified a number of strengths and concerns that should be considered in implementing the Council's recommendation in this important area.

Target Indicators

- Energy Efficiency
- Renewable Energy
- Efficient Electricity
- National and Economic Security
- Traffic Congestion
- Transportation Efficiency
- Reducing the Need to Travel With Increased Access
- Increasing Access

Policy Overview

The Energy and Transportation Task Force did not reach agreement on a recommendation in this area. However, after debating the work of several Task Forces on this topic, the Council made the following recommendation in the second chapter of the Council's report to the President, *Sustainable America: A New Consensus for Prosperity, Opportunity, and a Healthy Environment.*

The Council believes a tax system should be designed to raise sufficient revenues without discouraging capital formation, job creation, environmental improvement, and social equity. Currently, the federal government raises more than $1 trillion dollars per year, predominantly (nearly 90 percent) by taxing wages and personal and corporate income.[77] And since tax policies influence individual and institutional investment patterns and consumption decisions, the Council believes that an effective use of the tax system could be a powerful tool in meeting the challenges of sustainable development. Council

members wrestled with the question of whether these challenges could be met, in part, by shifting some of the nation's taxes to activities and forms of consumption that are economically bad for society--inefficiency, waste, antipollution--and away from those that are economically good--employment, income, savings, and investment.

Ideally, a tax system that supports the recommendations of the Council would promote economic growth and jobs in a socially equitable manner, while discouraging pollution and other forms of inefficiency. The Council believes substantial progress in reaching these objectives can be made through revenue- neutral system improvements--changes that shift the ways revenues are raised without increasing overall tax obligations. In addition to revenue neutrality, tax reform efforts must be guided by the following criteria:

- *Tax policy must ensure that individuals and families at different income levels are treated as fairly as possible. We, as a Council, strongly believe that taxes should not place a disproportionate burden on lower income individuals and families, and we recognize the limitation of some options--such as the value added tax or a national sales tax--in meeting this criterion. Federal tax policy must address social equity to be consistent with the goals of sustainable development.*

- *The tax system must promote savings and investment, employment, and economic growth. Although special tax, spending, and credit provisions may have been economically justified at some time in the nation @ development, they may no longer be serving their original purposes and instead may have unintended side effects that run counter to the national economic and environmental objectives. The Council is firmly convinced that any tax shift should encourage savings, private investment, and job creation.*

  Tax-based policy should also be more skillfully employed to provide for enhanced environmental performance. While there was strong support, among the Council members, to shift tax policy from "taxing goods to taxing bads," there was no consensus regarding any of the specific policy options discussed. However, the Council acknowledged that there is sufficient merit to both the market mechanism and pollution tax options to warrant further evaluation. Moreover, the Council did agree that any tax shift needs to be done gradually, will not obviate the need for legally enforceable environmental standards or agreements, and should be designed to increase the efficiency of national efforts to improve environmental quality.

Shift in Tax Policies

Begin the long-term process of shifting to tax policies that--without increasing overall tax burdens--encourage employment and economic opportunity while discouraging environmentally damaging production and consumption decisions.

To implement this policy recommendation the Council calls for the following action.

A national commission should be established to review the effect of federal tax and subsidy policies on the goals of sustainable development. The commission would have two major responsibilities. First, it should conduct an explicit assessment Of alternative tax policies and, in particular, should assess opportunities for increased use of pollution taxes while reducing reliance on more traditional income taxes. The commission should make recommendations to the President and Congress on tax reform initiatives that are consistent with the goals of economic prosperity, a healthy environment, and social equity.

TRADE-OFFS AND CONSIDERATIONS

In wrestling with this concept on its own, the Energy and Transportation Task Force identified a number of strengths and concerns that should be considered in implementing the Council's recommendation in this important area.

Pros

- Raises or offsets revenues (reducing the deficit or replacing more distortionary taxes).

- Encourages pollution prevention, and spurs investment, recycling, technological innovation, and reduced use of natural resources.

- Provides greater opportunities for new markets.

- Supports concept that the polluter pay for any damages.

Cons

- May be inflationary without appropriate compensatory actions, and could reduce growth and U.S. competitiveness
- Effects on total emissions may be less certain than under direct regulations
- Difficult to set "optimal" charges.
- May have disproportionate effects on some individuals and regions.

POLICY RECOMMENDATION 4

Regulatory Flexibility

The Energy and Transportation Task Force supports the concepts of regulatory flexibility when tied to performance-based standards.

Target Indicators

- Energy Efficiency
- Renewable Energy
- Efficient Electricity
- National and Economic Security
- Traffic Congestion
- Transportation Efficiency
- Reducing the Need to Travel With Increased Access
- Increasing Access

Background

Several recent federal initiatives (Climate Challenge, Climate Wise, and Industries of the Future) have focused on the formation of partnerships with broad industry groups to promote voluntary reductions in pollutants that exceed existing regulatory requirements. The U.S. Environmental Protection Agency's Common Sense Initiative lays the foundation for regulatory flexibility with facilities or companies that commit to go beyond compliance regulations. On March 16, 1995, the Administration announced a 25 point strategy to reinvent environmental regulation. The EPA regulatory reform attempts to fix problems with today's regulatory programs and simultaneously fosters partnerships between the federal government, businesses, environmentalists, states, and communities to develop innovative alternative management strategies for single facilities, industrial sectors, or geographic areas.

Policy Overview

The Eco-Efficiency Task Force developed a regulatory flexibility policy recommendation which was later refined and incorporated into the Council's report to the President. The Energy and Transportation Task Force's review of the work of the Eco-Efficiency Task Force yielded two important points relevant to energy and transportation sectors that should be considered when implementing the Council's policy recommendations in the area of regulatory reform (listed below.)

Increased Cost-Effectiveness of the Existing Regulatory System

Accelerate efforts to evaluate existing regulations and to create opportunities for attaining environmental goals at lower economic costs.

Alternative Performance-Based Management System

Create a bold, new alternative environmental management system designed to achieve superior environmental protection and economic development that relies on verifiable and enforceable performance-based standards and provides increased operational flexibility through a collaborative decision-making process.

Possible Implementation Approaches

First, energy efficiency should be encouraged as a method of pollution prevention in the alternative environmental management system. Cost effective energy efficiency investments, as stated earlier, lead to economic, environmental, and equity benefits by reducing energy costs for producers and consumers and the environmental impacts of energy production and use. For the majority of industries, introduction of innovative technologies that reduce pollution and lower compliance costs typically decreases energy consumption. Energy efficiency improvements are industrial process improvements. Domestic industries, for example, that produce the most pollution and incur the highest abatement costs also usually consume the most energy.[78] Capital

expenditures for industrial pollution abatement, control equipment, and operating costs totaled roughly $25 billion in 1992. Of this total, the chemical, petroleum refining, pulp and paper, and primary metals industries account for about 70 percent.[79] These same industries accounted for nearly two thirds of domestic industrial energy consumption.[80] The Energy and Transportation Task Force believes that successful industrial process efficiency research and development aimed at pollution prevention and waste minimization would reduce pollution remediation costs as well as consumption of energy and raw materials.

Second, federal research and development technology partnerships can serve not only as catalysts for innovation, but as potential economic incentives included in the alternative environmental management system. Opportunities exist for the private sector to enter technology partnerships with the federal sector in many areas. Licensing is available for technology transfer from U.S. federal laboratories for private sector demonstration and commercialization. Over 700 laboratories and facilities in the federal system are home to many unique scientific capabilities which can be accessed using a variety of cooperative mechanisms, including personnel exchanges, cooperative research and development agreements, and reimbursable work. Use of cooperative research offers both partners the opportunity to leverage scarce resources, provides an avenue for transfer of technology between partners, and indicates market priorities to the federal sector.

POLICY RECOMMENDATION 5

Local Authority for Market-Based Regional Congestion Management

State and local governments should be enabled and encouraged to develop market-based transportation management strategies that more fully reflect the costs of travel.

- Target Indicators
- National and Economic Security
- Traffic Congestion
- Transportation Efficiency
- Reducing the Need to Travel with Increased Access
- Increasing Access

Background

Traffic congestion in urban and suburban areas is a growing problem facing many regions of the United States. The causes are complex and interrelated--including migration to metropolitan areas and population growth, movement of families from urban to suburban areas, community design that promotes inefficient land use, and transportation systems that do not fully reflect the true costs of travel.

Some important strategies to reduce congestion fall outside the scope of the Energy and Transportation Task Force--for example, overall community design--but they can be found in the Sustainable Communities Chapter of the Council report. However, of more direct concern, states and local governments can choose to incorporate more fully the cost to all drivers of additional drivers using limited road space during peak hours of demand.

Policy Overview

State and local governments should be enabled and encouraged to develop market-based transportation management strategies that more fully reflect the costs of travel.

States and localities that choose to use market-based tools for managing congestion should apply the revenues raised to offset cuts in non-transportation taxes (especially those borne most heavily by the middle class), to enhance transportation system maintenance and services (including road, transit, non-motorized, and other options), and to provide toll discounts, exemptions, and/or rebates for low-income commuters who must travel to jobs when tolls are collected.

The U.S. Department of Transportation should encourage states and manufacturers to work together to standardize technology specifications to enable communities interested in using these strategies to adopt common standards for electronic road and parking pricing technologies. Federal funding bonuses should be available to states or regions that implement road user fees more fully reflecting the marginal costs generated by each motor vehicle trip.

Possible Implementation Approaches

Congress should enact legislation to remove provisions in current laws prohibiting toll collection on interstate and other federally funded highways. Employer commuter programs and other measures should be encouraged to counter negative effects on low income commuters/employees. Existing US Department of Transportation Intelligent Transportation System (ITS) funding should be targeted to promote flexible road pricing applications--for example, charging by time of day, vehicle type, number of occupants, and so forth.[81] Existing federal transportation funds should be used to provide funding bonuses for states and regions that adopt market-based systems to more fully attribute the external costs

of highway use and congestion to those that are using the highway at that time. Specific implementation of road pricing should be under local and state control.

Policy Implications

Time-of-day charges are common in the utility, telephone, airline, public transportation, and entertainment industries to allocate scarce peak capacity to those most willing to pay. It has been common practice to "price" access to scarce highway capacity in peak hours by allowing users to waste their time in traffic congestion. Singapore, Oslo, and Bergen have implemented peak period road fees.[82] More than eight U. S. communities* have prepared congestion pricing pilot projects. Potential benefits depend greatly on context and the system of administration, but most economists agree that social and economic benefits will far outweigh costs if tolls are collected using already proven automated electronic systems that do not require vehicles to slow down.

> ** U.S. Communities that have prepared congestion pricing pilot projects or study plans include San Francisco, CA, San Diego, CA, Los Angeles, CA, Boulder CO, Seattle, WA, Portland, MI, and the New York State Throughway Authority for Tappan Zee Bridge.*

Congestion pricing leaves all travelers better off than a simple vehicle miles traveled fee or current transportation financing systems, because trips can be shifted to uncongested periods. High-income travelers obtain significant time savings, while low-income travelers tend to be on the road less during congested hours. Geographic impacts will vary widely with local conditions. It should be noted that vehicle miles traveled fees are more effective at reducing pollution than congestion fees. Further, because congestion is estimated to cost over $100 billion per year, modest reductions in congestion through this strategy offer very low cost-benefit ratios and promise a significant boost in long-term U. S. economic performance. Estimates of GDP impact are unavailable, but widespread application could create significant employment, growth in electronics, communications, and construction, and lead to more efficient shipping systems and transportation investments.

Key Trade-Offs and Considerations

The perception of many people that "freeways" means free of charge, not free of intersections, combines with equity concerns and issues over how revenues are allocated to make this politically a potentially challenging proposal. Returning surplus revenues back to those who live in the affected corridors--through expanded alternative transportation services and user subsidies, periodic rebates, or property tax relief--might help everyone to focus on benefits and overcome the political challenges. Privacy concerns associated with electronic pricing can and must be addressed by offering anonymous cash or smart card accounts as an alternative to monthly credit card billings. Equity impacts can be substantially mitigated by the provision of discounts, exemptions, or rebates for low-income commuter trips to employment.

POLICY RECOMMENDATION 6

Location Efficient Mortgages

Encourage the development and adoption of techniques and lending practices that increase the borrowing power of potential home buyers in neighborhoods where they will have access to public transit and are likely to use it.

Target Indicators

- National and Economic Security
- Traffic Congestion
- Transportation Efficiency
- Reducing the Need to Travel with Increased Access
- Increasing Access

Background

Many factors influence where individuals live, including price, the quality of schools and other public services, convenience, personal preferences of various sorts, and the influence of government policies. Frequently, residences in high-density urban and suburban areas located in proximity to public transportation are more expensive, partly due to the convenience this public service offers. Some potential home buyers in these communities do not need to own an automobile and thus would not have the monthly expenses associated with it. Despite these likely reduced expenses, however, many of these home buyers are not able to qualify for a mortgage on a home near public transit and are forced to purchase a lower-priced home in a neighborhood that does not have practical alternatives to single-occupancy driving. As a result, people find it difficult to avoid the economic and environmental cost of driving alone, and lower-income individuals have even greater difficulty reaching jobs, goods, and services.

Policy Overview

The "locational" counterpart to the energy efficient mortgage, this proposal would increase the borrowing power of potential home buyers given the expected increases in disposable income that accrue from efficient and cost-effective residential locations, and the resulting absence of automobile payments, maintenance costs, insurance expenses, and other expenditures. This policy proposal has met with an extremely positive response from federal agencies, congressional committees, White House staff, and numerous bankers. The Federal National Mortgage Association (Fannie Mae) has expressed interest in the policy. In the time since the Task Force recommended this proposal to the Council, the President announced this concept as part of the U.S. Department of Housing and Urban Development's National Home Ownership Strategy.

Possible Implementation Approaches

The location-efficient mortgage policy recommendation includes a variety of specific recommendations for federal government action:

Research

- A primary research need is development of "location-efficiency values" for individual properties throughout a metropolitan area (see "information access" below), correlating with easily measured variables, demonstrated to influence transportation expenses.

- Statistical analysis of other factors to illuminate individual behavior and expenditure differences. These data could also relate to insurance costs, or commitments to purchase transit passes on a regular basis to qualify for location-efficient mortgages (which could reassure lenders).

- Alternative ways of factoring location-efficient mortgages need to be fully researched and analyzed. Primary methods include both debt service (principal, interest, taxes, and insurance minus location savings) and household income (household income available to service mortgage plus location savings) methods.

Information access

Convenient, cost-effective access to "location efficiency values" is needed by financial institutions, both in electronic form and on paper.

Secondary Mortgage Market Support

Support of the location-efficient mortgage by government-supported secondary mortgage market institutions is essential.

Demonstration

Many remaining questions about location-efficient mortgages could be more quickly, efficiently, and effectively answered through a pilot program than through additional research. A pilot program in several cities, including a wide mix of neighborhoods with good transit access, should be implemented by the federal government. Lenders with experience in residential lending should coordinate and advise these demonstrations.

The majority, if not all, of this program can be implemented by executive, administrative, and regulatory action, or under existing research and development programs in federal agencies.

The empirical basis for this proposal has been strengthened by a recent study of 27 California communities, conducted by Dr. John Holtzclaw, a consultant and chairman of the Sierra Club Transportation Committee. The study, *Using Residential Patterns to Decrease Auto Dependence*, commissioned by the Natural Resources Defense Council, uses regression analysis to compare mean distances cars in different California communities were driven as a function of a number of average characteristics of those communities. The strongest statistical relationship with mean community automobile driving distance was residential density, with access to transit also proving a statistically significant relationship. Other factors, including average community household income, did not show a statistically significant correlation with average distance cars were driven in the community. Using national average costs per car owned and per mile driven to calculate average household expenses for each community, he calculated that the differences in transportation costs between neighborhoods with high residential density and access to transit and other neighborhoods could be as much as $400 per month.84 Such location-related savings should be recognized in a household's qualification for mortgage financing.

Increasingly, mortgage lenders are relying on purely objective, formula-based criteria to control transaction costs. This policy is consistent with industry practice, which relies on key ratios as reliable predictors of repayment behavior. Temporary, behavior-based criteria are less likely to influence costs over the long-term of a home mortgage, due to changes in employment, commuting patterns, and household composition (such as children growing up, and so on).

Policy Implications

This policy serves equity, environmental, and economic values and goals. It will particularly serve minority and low-to-moderate income households by increasing their power to purchase homes in environmentally desirable areas. Just as the mortgage instruments that followed World War II influenced urban form by promoting suburban sprawl, this mortgage instrument will influence urban form by upgrading housing quality in denser urban areas, efficiently using existing infrastructure, and conserving open space.

POLICY RECOMMENDATION 7

Cash for Clunkers and Inspection and Maintenance

Strengthen current "Cash for Clunkers" programs by expanding them to include repair of some vehicles to low-emissions operation where appropriate.

Target Indicators

- Efficient Transportation

Acceptance by secondary market institutions and mortgage insurers is imperative. The evolution of research, development, and demonstration projects must be largely guided by the needs of these institutions and of primary mortgage lenders.

Background

Recently, companies with stationary sources of air pollution that are looking for more cost- effective methods to reduce pollution have implemented cash for clunkers programs rather than make expensive investments in pollution control in their facilities. Typically, the firms purchase and scrap older, badly maintained, heavily-polluting cars removing significant sources of air pollution from operation.

Although these types of programs can make important, cost-effective contributions to improving air quality, the emissions reductions may not always be permanent. For example, if the owners of clunkers use the money they receive to put another heavily polluting car on the road, the transaction has had no effect. A second problem area of these programs is that the potential number of participating vehicles is limited. Many highly-polluting vehicles provide the only available means of transportation for low-income individuals and are therefore not likely to be scrapped.

Policy Overview

Cash for clunkers programs should be expanded to cover repair as well as disposal. Cost-benefit analysis can be used to determine whether vehicles should be repaired or purchased. The benefits of expanding cash for clunkers programs to include inspection and repair are many.

First, there is a much higher chance that one clunker will not be replaced by another heavily polluting vehicle because ownership of the vehicle and the mobility it provides is retained. The vehicles, once repaired free of charge to the driver (possibly requiring an income means test to qualify), would need to be monitored annually to assure they remain in a low-polluting condition.

Second, individuals who use a clunker for access to employment could participate in the expanded program, whereas they are excluded from programs that only discard their vehicles.

Local emissions-repair jobs are promoted in neighborhoods with high unemployment, where many "clunker" owners reside.

The program would simultaneously fund education and training programs for emissions repairs, providing job training credits for students as well as emission credits for regional (same air basin or non-attainment area) industry. The program may also provide jobs for graduates, depending on the number of participants and vehicle repairs.

The higher supply of skilled laborers specializing in the automobile emission repair may lower the overall market cost of emissions repairs, and increase the number of cars repaired.

Cost-effectiveness will be increased if the cost of repairs is less than the cost of scrapping the vehicles under "cash for clunkers" programs.

While providing these additional benefits, the expanded cash for clunkers policy also retains the original benefits of programs, primarily through financing the venture by trading the emissions saved (as estimated from the clunkers measured tailpipe emissions and the vehicle miles driven in a calendar year) with stationary-source polluters.

Possible Implementation Approaches

This policy could be implemented under current law but would be facilitated by dedication of federal, state, or local funding to a pilot project for the expanded cash for clunkers approach.

Policy Implications

Economy, environment, and equity are all served by this policy. The program would be financed by capturing a small portion of the cost savings to private industry, with an equivalent or higher emissions reduction. Some kind of "seed money" will be needed to finance the establishment of the program prior to the availability of emissions credits for trading-meaning that many costs would be immediate, while the return on the investment would be slower. Although the seed money could be government capital, it is highly likely that local industries can be encouraged to finance the initial venture based on expected savings in pollution regulation compliance costs.

Key Trade-Offs and Concerns

The impacts of the program may decrease over time as the number of highly polluting cars decreases. Technology improvements may increase the cost-effectiveness of higher emission standards for older cars. Some of these cars may be repaired and then moved out of non-attainment areas. Annual inspection and maintenance may be difficult to enforce in subsequent years. Given the varying levels of reactivity and toxicity between different volatile organic compounds, trading one emission for another may prove problematic.

POLICY RECOMMENDATION 8

Building on Current Successes

Support the general direction of current policy initiatives that promote the research, development, and private sector application of cost-effective technologies and practices that support the sustainable production and use of energy.

Target Indicators

The current policies described below contribute to a variety of energy or transportation indicators already cited in the previous chapter.

Opposition is not expected from environmental, economic equity, automotive, or industrial interests. This policy should prove attractive to many interests.

Background

Many existing policies are moving some sectors of society in the direction of sustainable development. At a time when the Administration, Congress, and the public are reviewing the effectiveness of all government programs, it is useful to give attention to some that the Task Force believes are contributing to the goals it has set.

Policy Description

The Energy and Transportation Task Force endorses the general direction of IO current policy initiatives discussed below, including public sector practices and public-private partnerships that promote the research, development, and private sector application of cost-effective technologies and practices that support the sustainable production and use of energy. While not all members agree with the specifics of every policy, a strong majority concur that the policies are making contributions to the goals and are worthy of support.

Make Housing More Affordable and Sustainable Through Energy Efficiency

Major capital investment and shifts in consumer demand must occur to increase housing affordability through increased energy efficiency in the nation's housing stock. New construction, resales of existing homes, and replacement of heating and cooling equipment provide 10 million opportunities annually to accomplish this goal using today's technologies.[85] Utility consumption can be readily reduced by 20 to 40 percent new construction.[86] Unfortunately, the marketplace and consumers do not place a high value on these investments given that real prices of energy are at their lowest levels in 20 years.[87]

Several policies increase residential housing affordability and sustainability by providing public- private financing for energy efficiency improvements in new, existing, and low-income housing. Cost-effective policy initiatives that promote energy-efficiency financing, home energy and environmental ratings, and cost-effective energy building standards should be continued and if possible expanded and combined with revenue-neutral tax incentives. The Climate Change Action Plan estimates that if 20 percent of existing homes were upgraded by the year 2000 using cost-effective strategies, it would stimulate $11.7 billion in private sector investments, yielding energy savings worth approximately $5.4 billion with additional savings worth up $21.6 billion for the period 2001-2010.[88]

Energy-Efficiency Financing programs provide market-based incentives for energy improve through:

- Uniform underwriting policies for both federal and secondary mortgage lend
- Standardizing the incorporation of home energy efficiency ratings.

- Aggressively expanding and implementing existing federal energy efficient mortgage programs as part of the agency "reinvention" process.

Home energy and environmental ratings provide national uniform guidelines for home rating systems to incorporate environmental impacts. Ratings programs developed by the U.S. Department of Energy, Edison Electric Institute, the City of Austin, and others could be used a national model. These ratings should be required for all federally insured, new construction in areas designated as environmentally sensitive with cost sharing by the federal government, homeowner, and the utility provider. States and/or localities should be given incentives to adopt cost-effective energy efficiency building standards. The Energy Policy Act of 1992 (EPAct) requires states to consider adopting model energy codes and financial incentives for adoption could be provided through the permissive use of umbrella block grant funding.[89]

Moreover, investment tax credits could be provided for two percent of the sales price ($2,000 maximum) for purchasers of new homes that exceed Federal Housing Authority building energy code requirements (CABO Model Energy Code 1993) by 25 percent and three percent for purchasers of existing homes ($2,500 maximum) who install energy improvements that increase pre-retro-fit efficiency by 25 percent.

Broaden Golden Carrot™ Manufacturer Incentives for Super-Efficient Products

This policy would promote incentives administered through public-private partnerships (based on the successful program that developed the Super Efficient Refrigerator) and reinforces existing work underway by the Consortium for Energy Efficiency, a public-private partnership that provides financial and advisory support.[90]

The consortium has launched three new projects--to improve commercial rooftop air conditioners, residential central air conditioners, and residential clothes washers--and has several more under varying degrees of development. Manufacturer incentives should be given for improving other energy-consuming technologies in the residential, commercial, and industrial sectors. The federal government should continue, and to the extent possible increase, funding for the program through the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency.

Federal agencies should also commit to purchase the resulting high-efficiency products to meet their procurement needs, buttressing their current commitment to purchase energy-efficient products. By encouraging direct financial incentives, a higher degree of market certainty, and/or a clear efficient t the consortium he s manufacturers economical 'usti retooling to produce higher efficiency products. Establishing a market leadership position in energy-efficient products would provide U.S. companies with a substantial opportunity to capture world markets. [*Note: the errors in the above paragraph are indecipherable*].

Expand Federal Procurement Efforts to Develop Markets for Energy-Efficient Products

The federal government is the world's largest single customer for most energy-related products ($10-20 billion per year); total state and local government purchases are more than triple this amount.[91] The EPAct and Executive Order 12902 encourage federal agencies to buy products in the upper 25 percent of the market based on energy efficiency, and to use their buying power to help commercialize new technologies.[92] Work to implement these policies should continue and be expanded if possible.

Federal agencies should allocate two percent of energy-related product purchasing to advanced, efficient and renewable energy technologies to help create a market for new technologies stimulated by Golden Carrot™ incentives. A life-cycle cost of federal purchases should be based on the prevailing commercial cost of fuel and electricity, plus a modest factor for environmental externalities. State and local governments should be able to use the U.S. Government Services Administration catalogs and schedules, and to purchase efficient products through the U.S. Department of Defense, Logistics Agency. The U.S. Department of Energy should work with other agencies to publish a best-practice guide in energy-efficient purchasing.

Improve Technology and Information Transfer

Energy-efficiency technology and information transfer was recognized as a barrier to the market penetration of energy efficiency technologies and products by Congress in the EPAct. The public and private sectors should continue efforts to eliminate the information transfer barrier through education programs, product literature, and other initiatives. Utilities have constructed four regional energy centers with little if any, financial support from the federal government. The present DOE grants to establish or enhance 10 regional energy centers created by EPAct should be expanded to construct 25 such centers by 2000.[93] The appropriate federal agencies should also encourage state governments to require energy efficiency information in their educational curricula, provide more

information via the Internet, and expand energy efficiency labeling to include more products.

Expand Cost-Effective Efficiency Standards

Programs to develop cost-effective and technically feasible energy efficiency standards could be expanded in several areas.

- Standards for new buildings could be made more stringent and/or more effectively implemented. States and certain federal agencies already have responsibility under EPAct and other legislation to periodically upgrade and effectively implement building efficiency standards, and the DOE should continue to support these efforts.

- Standards for most residential appliances and equipment, packaged heating, cooling and water heating units used in commercial buildings, fluorescent light ballasts and tubes, reflector lamps, and most 1-200 horsepower electric motors have been established by statute and DOE should continue to periodically review (usually every five years) and update these standards as required.

- Currently, DOE is determining whether standards would be technically feasible and economically justified for high-intensity discharge lamps, distribution transformers, and small (

- DOE also has authority to--and should--establish cost-effective and technically feasible standards for other (generally unspecified) categories of equipment. It has proposed standards for televisions and should establish standards for other categories, such as office equipment, where is it cost-effective.

- If necessary, new authority should be sought for economically justifiable standards in other areas (such as industrial equipment other than motors).

The energy, environmental, and economic benefits that might result from expanded and/or more stringent efficiency standards for buildings or equipment are uncertain, but could be as large as $10 billion.

Maintain Federal Research & Development Emphasis on Renewable and Clean Fossil Energy Technologies

The finite available funding for federal research and development programs for electric generation technology should continue to be shifted toward renewable resource and high efficiency fossil technologies.

DOE programs are currently focusing on several areas aimed at the goal of cost competitiveness, increased efficiency and improved environ-mental performance for fossil electric generating systems. These initiatives should continue. However, in a sustainable economy, renewable electric generation technologies are preferred over those that are not renewable due to their lower overall environmental impact. Accordingly, to move toward a sustainable energy environment, federal electric generation research and development funding should continue to focus to a larger extent on renewable technologies.

To that end, a Renewable Technology Commercialization Program modeled along the lines of the Clean Coal Technology Program should be implemented. The clean coal effort has been a very successful market-driven program that leverages federal resources with a high degree of private sector funding to accelerate the commercialization of clean coal technologies.[94] Historically, renewable electric generation technologies have received less federal research development and demonstration funding as compared to other generation technologies. Although the DOE has increased funding for renewable technologies by 66 percent--to $228 million in FY 1995--funding allocations for nuclear, coal, and other generating technologies still receive 75 percent of the available funding. Furthermore, funding for fusion technologies has increased slightly in recent years and will still account for $145 million more than renewables in 1995.[95]

Important fossil generation technology development programs include: the Advanced Clean/Efficient Power Systems Program, which supports advanced power systems that achieve minimal environmental impact, high thermal efficiencies, and reliability of supply; Advanced Research and Technical Development Activities, which supports research for super-clean, high efficiency coal power systems; the Clean Coal Technology Program, which supports 45 commercial projects to which the private sector has contributed 66 percent ;[96] the Advanced Turbine Systems Program, which seeks to increase the efficiency of gas turbines and reduce nitrogen oxides emissions; and the Fuel Cells initiative, which is to lead to the commercialization of highly efficient, environmentally superior power systems fired by a variety of fuels.

While these initiatives continue, a meaningful market-based renewables initiative should be implemented modeled after existing programs and sharing the incremental technological and economic risks associated with the commercialization of technologies in the United States and in developing counties.

Incorporate Sustainable Development into Federal Disaster Recovery Assistance

Without question, disaster response should focus on helping people return to their normal lives as quickly as possible. However, current relief assistance only funds rebuilding buildings and communities the way they were before a disaster. This is generally with little or no attempt to provide communities the opportunity to safeguard against natural disasters, reduce human prove conflict with natural systems, decrease the consumption of non-renewable resources, increase the quality of the built environment, and move toward their economic, environmental, social, and cultural goals. The paybacks to communities and homeowners who are able to rebuild using energy efficient technologies can be as short as two to six years and many upgrades can be funded with, government loan guarantees, utility rebates and state programs.

The federal government expended over $6 billion in disaster relief assistance in 1993, with no attempt to provide communities the opportunity to rebuild using more sustainable technologies and practices." The Federal Emergency Management Agency, the U.S. Departments of Energy, Transportation, and Housing and Urban Development, and the Small Business Administration should accelerate efforts to include the principles of sustainable development in their disaster assistance and coordinate the application of all existing public and private resources in times of emergency. An executive order and/or legislation should create a permanent interagency "swat team" to coordinate and implement this common sense work.

Focus Export Assistance to Increase U.S. Exports and Build Markets for Renewables in Developing Countries

This policy proposes to expand current initiatives to promote the commercialization and exportation of renewable energy technologies by establishing a Renewable Energy Finance Fund using an existing financial institution. This Fund would provide long-term project financing (10-15 years) at world market rates for renewable energy projects that have signed long-term contracts to sell the power to a utility or a government entity.

The major obstacle to selling U.S. renewable energy products and projects in the lesser developed countries is the lack of financing sources compared to those available to conventional fossil energy projects. This policy would provide a pool of funds to allow U.S. companies to take advantage of the emerging power markets that are now being exploited by European competitors with financing from their governments. Modular renewable technologies may bring electricity to regions of the lesser developed countries that have no electrical infrastructure at a much lower cost than building the infrastructure and central station electric generation. This fund could be established by using institutions such as the Overseas Private Investment Corporation or the Export-Import Bank. Exporting renewables helps the balance of trade and creates domestic jobs that promote global sustainability.

Support the Partnership for a New Generation of Vehicles

The Partnership for a New Generation of Vehicles focuses government and industry research and development resources on a consensus set of goals and timetables that will preserve personal mobility while enhancing national competitiveness, reducing petroleum imports, and reducing emissions of greenhouse gases and pollutants." The partnership's three primary goals are to:

- Significantly improve national competitiveness in manufacturing by pursuing advances that could reduce production costs and product development times.
- Pursue and implement commercially viable advances that can lead to improvement in the fuel efficiency and emissions of conventional vehicles.
- Develop a revolutionary class of vehicles that could achieve fuel efficiencies of up to three times today's comparable vehicle.

The new vehicle would at the same time cost no more to own and operate; would maintain performance, size, and utility; and would meet or exceed safety and emission requirements. The timetable is targeted towards development of a production prototype by 2004 that meets the above criteria, with research funding that is split about evenly between government and industry. If successful, this program would increase energy security, conservation of depletable resources, and the economic standard of living.

Reauthorize the Intermodal Surface Transportation Efficiency Act

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) signified a dramatic departure from previous transportation decision-making processes.[99] Its reauthorization in 1996 is a powerful and broad lever for supporting the goals of sustainable development. Conversely, reauthorizing a version of ISTEA that does not support sustainable development could seriously compromise work to reduce growth in vehicle miles traveled, as well as weaken other important contributions to achieving the Task Force transportation goal and indicators.

- The shift in focus of funding from new construction to managing and maintaining existing transportation systems.
- Greatly strengthened local planning and requirements such that a broader array of concerns be considered, such as air quality, the environment, social equity, land use, energy efficiency and economic development.
- The ability of states to shift a portion of funds from highway projects to other modes.
- Aspects that promote the development of integrated, multimodal transportation systems.
- Greater public participation in the decision-making process.
- Management systems that are created to track the performance of pavement, bridge, transit, safety, congestion, and intermodal operations; and provisions to coordinate goals, implementation, and enforcement measures with other legislation, including Title VI of the Civil Rights Act, the Clean Air Act Amendments of 1990, the Americans with Disabilities Act, and so on.

ADDITIONAL TRANSPORTATION CONSIDERATIONS

The Energy and Transportation Task Force recognizes that the policies it has recommended are not sufficient in themselves to meet the transportation goal. Through the course of its work, the Task Force also recognized the significantly greater analytical resources available to the Presidential Advisory Group on Greenhouse Gas Emissions from Personal Motor Vehicles and agreed not to make recommendations on policy approaches that were to be central to the deliberations of that advisory committee. Although the advisory group completed its work without issuing a consensus final report, policy makers can refer to the advisory group's docket for additional recommendations to move the nation closer to transportation goals in this area.

During the reauthorization in 1997, ISTEA should be designed to further support efforts to reduce growth in vehicle miles traveled, curb air pollution, control greenhouse gas emissions, and help stimulate sustainable economic development. ISTEA should permit states or regions to choose to invest federal transportation funding for intercity rail projects. Specific items that could strengthen ISTEA's support of sustainable development include establishing a system that uses performance measures to determine how well transportation investments are helping to meet stated goals. Locally set land use performance measures could also be included in ISTEA reauthorization to encourage closer linkage between land use decisions and transportation investments. ISTEA's impact cannot be understated. It not only authorized the amount of federal money that would be spent for transportation ($155 billion over six years in the 1991 act) but also largely specified how that money would be spent. A similar level of funding is expected for reauthorization.

APPENDIX A
Scenario Narratives

ALTERNATIVE SCENARIOS PLANNING PROCESS

As collaborative tools, scenarios allow multiple stakeholders to address issues such as sustainability that do not conform to typical "expert report" solutions. Sometimes, issues and solutions are clear; the problem of a broken leg and what to do about it is a good example. Alternatively, the issue may be clear, but the solution is not; with arthritis, the patient and doctor know the problem but are not sure of the treatment. In other situations, like sustainability, both the issue and the response are unclear. Here, the definition of sustainability--and the solution--lies with stakeholders; experts only advise because the economic, environmental, and social dimensions of sustainability transcend any single discipline.

Scenarios are powerful tools for putting the world in a fresh light and to explore new ideas, such as sustainability. What wind tunnels are to new airplane design, scenarios can be to future energy and transportation strategies: instructive simulations of possible operating conditions. As wind tunnel testing leads to a stronger, faster airplane, scenarios can help put the nation on a more sustainable path.

This approach is extraordinarily valuable in its ability to address the nature of sustainability. "Sustainability" implies a future condition of society in which technology is in harmony with the natural world, economic needs are met, and social equity and justice are assured. Instead of dealing with present disagreements, scenarios help to help a consensus--a shared vision--about a sustainable future.

The Sustainable Energy and Transportation Scenarios Project yielded important lessons that were critical to the development of the Energy and Transportation Task Force goals and policy recommendations for the Council's consideration. The Global Business Network, a consultant with considerable experience developing scenarios for strategic and policy planning, was retained to facilitate the project and help provide management and logistics support.

The project began by drawing together the wealth of existing research to understand the dynamics shaping the energy and transportation sectors. Members identified the factors and elements that significantly influence energy and transportation, including economic structure and performance, environmental issues, degree of social equity, technology developments, population changes, land use and community design, societal values, and political developments.

These so-called driving forces were combined in different ways to lay out 15 preliminary paths--scenarios--these sectors may take by the year 2025. After further research and information gathering, members more fully developed and refined alternative scenarios. (As part of the Council's regional visit to the Great Lakes area in July of 1994, Council members and the public were given the opportunity to comment on the scenarios project and the progress to date.) Later, characteristics of energy and transportation use in each scenario were assigned numerical values according to the "plot" of each scenario narrative. These characteristics were modeled to compare the energy and transportation use patterns of each possible future. As a reminder, scenarios are not predictions: they describe how the future "might," not "should," unfold.

THE WAY WE ARE

This is a world where gradual change continues, but the future is not necessarily a mirror of the past. The restructuring of the global economy is the major force shaping this scenario. Fragmentation, not cooperation, keeps people's lives a bit unsettled. Event with mixed signals, however, incremental improvements abound giving most people, but not all, a sense of progress. A shifting job market in the United States and the resulting underemployment keep real incomes stagnant in many sectors well into the new century. In this world, people are more mobile, but also face increasing congestion. Although energy stays relatively abundant and cheap, other issues, including environmental concerns, encourage protracted policy debates. Looking back from 2025, observers would note that most Americans are better off, in part due to technology instead of rapidly increasing incomes, but remain concerned about chronic social problems and a latent perception that the United States is no longer the world's leading economic power.

On June 10, 2000, the Economist's cover story on "America: Boom, Bust, Muddle...or Work Still in Progress?" described the restructuring economy of the U.S. With the pace of industrialization accelerating among "newly exporting countries," (these include: China, other Asian nations, Latin America), the advanced industrialized countries were caught in mature, but slow growth patterns. overall productivity was relatively flat. Furthermore, a continuation of trends present in today's economy (including corporate restructuring, increased foreign and domestic competition, higher returns to education, etc.) meant that modest increases in real income experienced in the United States were increasingly unevenly distributed.

Southern California in 1994 foreshadowed the economic future of the United States: large firms downsized and moved manufacturing operations to less costly states, while new, small manufacturers, including high-tech, employed low-cost labor (many immigrants) and paid limited benefits. Economic activity was becoming much less cyclical because of the globalization of production and finance as well as the impending convergence of factor costs between the developed and developing world. The inventory dance, which had been a major business cycle driver, was nearly gone, undermined by just-in-time production paradigms and an enormous supply of substitutable capacity in the world market, easily accessible through information technology. The cyclical dance of inflation and higher interest rates was similarly subdued by global capital markets--but so were most real wages in the United States as global competition demanded tight cost controls. Overall, U.S. population growth continued, albeit slowly, as the Sunbelt and the Northwest grew rapidly and immigration remained steady. In developing countries, population continued to burgeon and environmental problems, such as drinking water and air pollution, increasingly plagued nations.

Internationally, developing countries generally followed the U.S. model of industrialization but the pace was more rapid; persistent conflicts, however, inhibited closer political and economic ties, including expanded trade with partners like Japan. On the positive side, advances in technology and its diffusion allowed faster infrastructure development in many countries compared to historical patterns. By 1994 in China, for example, a country with limited telephone service, pagers, and telephones, were linking this emerging giant with the global economy. But on a pessimistic note, the United States and other industrialized countries were troubled by chronic conflicts across the globe, as a new world order evolved far more slowly than anyone imagined following the end of the Cold War. The U.S. was stuck paying world policemen more than desired because without its leadership cooperative multilateral partnerships were difficult to establish.

Far from being discouraging, U.S. productivity started to improve by the late 1990s thanks to the expanding use of information technology. Throughout the end of the 1990s, new entrepreneurs and small businesses proliferated and grew as work-at-home and telecommuting increased (which also allowed suburbs to continue expanding). Exports of services continued to grow rapidly as financial and education-entertainment firms sold bytes not goods. By 2015, the value of services easily dwarfed the value of trade, much like capital flows overwhelmed goods in the 1980s. "More with less" became the corporate maxim of the new century. But there was a cost: unequal growth in jobs and incomes. Fewer higher paying jobs, longer retraining transitions, and stagnant real wages kept many people frustrated, particularly in urban areas.

Primary energy remained relatively cheap and abundant. Oil imports to the United States continued to account for a high percentage of supply as the world price stayed relatively low (in the $20-28 per barrel range). The supply of domestic coal was never in doubt and natural gas reserves seemed to be replenished with modest price increases. Retail wheeling in electricity took off slowly, as states and public utility commissions argued over jurisdictional issues. Natural gas share of generation slowly increased, as independent power producers (IPPs) grew. Efficiency gradually increased in most energy sectors. Technological improvements also were evident, enabling improved oil recovery and clean coal techniques in particular.

Existing land-use patterns continued, as the fast growing edge cities in the suburbs sprawled across the country. Much of the growth was away from decaying urban cores, where high unemployment, persistent social ills, and decaying infrastructure stymied redevelopment plans. Some cities, like Portland, Oregon fostered local urban growth and the Empowerment Zones implemented in 1994 proved to be an effective catalyst for growth in the cities where they were established. Improved telecommunications allowed growth to spread into rural areas as jobs and corporate operations shifted locations to control costs. Automobiles remained the primary transport mode, but vehicle miles traveled started to flatten by 2010 as growing traffic congestion and telecommunications (shopping-at-home made a difference) affected transport volumes. Transportation energy use began to decline as more efficient vehicles, developed by the Partnership for a New Generation of Vehicles, started in 1993, became a larger part of the vehicle fleet. America's continued love affair with mobility and freedom made gas or other energy taxes politically unfeasible, although some small increases were pushed through primarily to generate revenue to fix roads and bridges.

The greatest successes were political as the economy and persistent social ills forced protracted, if not polarized, policy debates. While real incomes grew slowly in the United States, the benefits of this growth were distributed unevenly. Lack of investment in infrastructure (let alone rebuilding) continued in most cities as budgets were tight. Chronic urban problems increased antagonism between federal, state, and local governments as viable solutions were not forthcoming. Violent crime fell slowly, due, in part, to the "three strikes, you're out" initiative that spread throughout the United States but also because of the simple demographics: fewer at-risk youth and young adults. Nevertheless, high crime levels

persisted overall as the "have nots" grew across racial, gender and class distinctions. Education improved in most parts of the country, partly driven by the information superhighway, but disparities in access and knowledge levels continued to divide America.

In this world, the environment was only one of the many competing issues. As developing countries grew, pollution and a gradual destruction of the environment (air, water, forests, habitats) were increasingly evident, especially because global competition favored cheaper, less efficient, dirtier technologies. While global greenhouse gas concentration continued to increase, the U.S. emissions growth rate proved difficult to decrease. Air quality slowly improved in many urban areas, including Los Angeles (e.g., the Clean Air Act standards were attained in most cities post-2010), as tighter rules and cleaner cars made a difference. However, both ozone and particulate levels remained at levels close, though generally below, the legal standards. Many local areas addressed their own environmental issues, such as drinking water, but coordination at state and federal levels was fraught with delays. Politically, frustrated voters brought forth multiple candidates for public offices at all levels of government, a new trend that marked differing interests and agendas. While most Americans felt better off in 2024, many still feared for their lifestyles and jobs as a new world economy continued reshaping the map.

Early Indicators of This Scenario

- Incremental shifts only.
- Congestion affects more cities and suburbs.
- Oil imports continue as high percentage of U.S. totals.
- Lengthy, polarized policy debates.
- Social ills (poverty, crime, etc.) continue to grow, with little impact from legislative efforts.
- Multi-candidate elections.
- Increasing gap between rich and poor, both nationally and internationally.
- Persistent regional conflicts internationally

On the first Earth Day in 1970, Time magazine declared "The Decade of the Environment." But while environmental issues were very much on the larger political agenda, two oil crises, double digit inflation, a volatile economy, and stagflation all helped to move the environment issue away from center stage. In the 1990s, sustainability once again became a major political issue, but in competition with an array of stubborn social problems, all demanding immediate attention and resources. Deja vu? Some feared a similar tale--that the environment would fade again--but others saw a value shift toward a broader social context and understanding of sustainability. Indeed, history did not repeat itself but instead followed a new script for the next 30 years.

A widening income gap was a major driver. Most income growth was concentrated in the upper 20 percent of households, which produced a skewed distribution. From the 1970s to the 1990s, the middle class shrank while the poor and the working poor increased proportionally. There was no universal consensus about the cause of this trend, but many cited slow economic growth, changes in the tax code, and reductions in social benefits.

Inclusive Development

This is a world where social and economic priorities overwhelm environmental ones, at least temporarily. Over the course of the 1990s, a new social consensus emerges in the United States that acknowledges that the widening gap in incomes and advancement opportunities is not sustainable. In part, this consensus is driven by a growing lower-middle class, which increasingly crosses racial and gender distinctions, as well as by a restructuring economy which disenfranchises traditional workers – the heart of middle America who face fewer and lower paying jobs. The groundwork for this scenario was laid in the 1970s when the average American made limited economic progress, real income growth slowed, and many began sliding backwards as the trend continued into the 1990s, concerns about social justice came into the forefront – a concern that already motivated many environmentally concerned citizens. The Inclusive Development scenario presents the story of a new political bargain that delays the timing of environmental progress.

Industrial restructuring was another critical factor. For years, the U.S. economy had been moving away from manufacturing towards services and information-based jobs. The problem: transitions took time, often with significant costs. Many experienced job and income losses in the 1980s and early 1990s as firms downsized, jobs went abroad, and benefits were cut. Behind these changes was the battle over a share of the economic benefits between workers, capital (both equity and debt), and consumer value. The interests of workers were on the losing end as the dream of ever-increasing standards of living was effectively shattered and leaner companies battled global competition with fewer workers.

As the 20th century ended, growing international market competition and persistent regional conflicts buffeted clear policy choices. While trade conflicts between the United States and Japan continued, the Asian "tigers" continued to worsen and interest rates slowly climbed to keep a hold on inflation (yet at a price: slower growth). For the average worker, frustration with jobs translated into dismay at foreign policies and the appropriate U.S. role, as in Rwanda and Haiti, even Cuba. Immigration slowed as officials tightened entry policies. But historical isolationist--and protectionist--tensions grew as the U.S. economy sputtered with GDP growth stuck in the low two percent range.

The decline of inner cities in the 1960s-1980s spread outward to many inner suburban areas in the late 1990s as more households fell out of the middle class due to the loss of higher wage manufacturing jobs and replacement by lower wage service employment. New housing and job growth was concentrated in a new third ring of automobile-dependent edge cities and suburbs, which stimulated a continued rise in vehicle miles of travel, vehicle trips per capita and suburban traffic congestion. Transportation investment continued to fall short of the growth in demand while federal tax policies and local zoning regulations continued to encourage low density development. The share of jobs accessible to public transportation continued to fall through the 1990s, excluding many urban workers from employment opportunities and leading to a shortage of labor for lower pay service work in many affluent outer suburban areas, where affordable housing was often excluded by local policies.

By 2000, the growing number of disenfranchised reached a political crescendo. Rallies and picket lines protesting worsening inequities, combined with widespread frustration over environmental problems that disproportionately affected the poor spurred a nationwide campaign to address the social and economic issues effectively. In 2000 the social justice agenda was echoed in multi-candidate election campaigns in nearly every state, in the mass media, and by a growing percentage of the public (especially those with new, lower paying jobs). National political parties fractured to include and redress these issues. Environmentalists often found their agenda blocked by those who would bear the costs most heavily. Economic and social concerns about such issues as education, crime, drugs, and unemployment pushed aside most environmental issues, though battle scars of long time advocates were long and deep. By 2002, the fading memory of the near victorious anti-NAFTA coalition between environmentalists and labor led advocates on both sides to propose a new social compact: poverty first, then the environment. Businesses adjusted to this new compact by giving more in wages and benefits to workers, raising prices, on many items and delaying costly efforts to protect the environment.

The strong trend toward deregulation and free market solutions to economic issues slowed dramatically, as regulators were forced to consider job impacts. Evidence became clear as the movement toward retail wheeling in electricity markets was slowed dramatically and only a piecemeal program of wholesale electric wheeling was allowed. In the transportation sector, job creating highway and urban mass transit systems were broadly supported at state and local levels.

By late 2002, a series of gradual reconciliations to unfold as specific policy steps. The Administration was confronted with a clear consensus to improve economic growth--even at the expense of environmental issues; to ameliorate the pain of economic restructuring and facilitate necessary labor force transitions; to shift the tax burden toward the better-off, and finally, to seriously address chronic social concerns. Although most of these issues had been part of the broader agenda of the early 1990s, the political will, backed by clear popular support, had been lacking at that time.

This shift in values toward broader public concerns was not unprecedented in U.S. history. Arthur Schlesinger Jr., in his book *The Cycles of American History*, suggested how the pendulum swung between private and collective phases. After decades of focusing on private lives, social costs accumulate and create pressure for a renewed focus on the public realms, and vice-versa. The two decades of the 1970s and 1980s, he argued, were characterized by personal and private concerns which led to a "swing" back as America entered the 1990s.

The first hurdle was Congress. There was strong resistance to the Administration's proposals. The "no more taxes" and anti-income redistribution sentiments were still very much alive. Many believed that social problems should be solved at the local level; that individuals should be responsible for their fate in life; and that there was no role for the federal government. The Administration proposals could not get past the filibuster.

By 2004, a new Congress emerged, heavy with representatives of the emerging social consensus. The decimal census of the year 2000 and resulting redistricting brought a sufficient majority to pass Administration proposals. As new policies and resources started to flow to local communities, the sense of hopelessness started to lift for many.

Technology, education and training, and reforms in governance all played a key role in bringing about this new social agenda. New public transit technologies became a vehicle for both job creation and improved living conditions

for those with limited transit options. The information superhighway played a key role in providing an easier way for the formerly disenfranchised to be heard, as voting by phone and other communication techniques were used to access voters. A re-emphasis on quality education penetrated even tough urban communities, which, along with targeted investment programs, began to turn the tide against crime and to improve the quality of lives. As the sophisticated service economy developed more stable, high value-added jobs, wages began a virtuous circle upward. More often than note, reduced environmental impacts were a side benefit.

Limited innovation or change was evident in energy sectors. Oil was relatively cheap (in the $19-25 range), while oil imports to the United States remained high. More efficient energy and transport changes were hampered as a result of reduced research and development funding and capital investments, resulting from shifting funds in the federal budget towards social programs. Utility deregulation was limited, as public utility commissions were increasingly concerned with access, service, and cost considerations. Natural gas shares in power generation continued to slowly increase, primarily for peak load generation. The price of alternative energy continued to decrease, but slowly, and their share of generation (as well as vehicle fleet penetration) grew slowly. Limited technological progress and efficiency gains were achieved by 2010.

By the later years of the first decade of the 21st century, a new social compact was clearly in place. A combination of public policy, individual responsibility, and economic evolution was producing strong economic growth, renewing the sense of community, and accelerating the creation of good jobs. For example, the rebuilding of urban infrastructure provided many jobs. The gap between the top and bottom income brackets had narrowed, not by lowering the top but by bringing up the bottom. Somewhat more restrictive immigration policies led to the stabilization of U.S. population. This helped, in part, to focus public and private resources. Now that a solid economic and social foundation had been reestablished and standards of living improved, a broader agenda, including the environment, began to unfold.

Internationally, the U.S. lead in addressing equity concerns was not mirrored by most developing countries, as the high returns needed to attract risk capital for economic development dominated their agendas. By 2010, however, growing social problems and resource conflicts throughout the globe convinced many leaders to reconsider domestic priorities.

Following a decade of further debate, research, and innovation, another stage of social-environmental consensus emerged around 2015, accelerating environmental progress. New economic indicators measured, among other things, industrial throughput (e.g., new measures of efficiency and waste), natural capital use, and quality of life. Moreover, the "greening" of America, was mirrored overseas. Europe had struggled with the same question as the United States and had followed a similar path. By 2025, many industrialized nations were stronger economically, more equitable, and living in greater harmony with nature, although few developing countries had achieved similar stability and balance. But a question lingered in the minds of many policy makers. Did this same social and economic development logic apply to the richer old millions of the industrialized world and the poor young billions of the developing world?

EARLY INDICATORS OF THIS SCENARIO

- Current difficulties of moving environmental legislation.
- Growing social problems.
- Concern about the distributive impact of costs.
- Election of Clinton/Gore in 1996.
- Growing political power of social/equity non-government organizations.

On October 17, 2001, Hurricane Daniel slammed into North and South Carolina, with insured losses totaling more than $30 billion, almost twice those from Andrew in 1992. The following year Hurricane Barbara struck the Gulf Coast, with losses of "just" $10 billion, but the major story was the typhoon and tsunami that hit Japan causing damaged well beyond $300 billion. When combined with an increased frequency of droughts and heat waves in the Midwest, scientific and public concern about climate variability was heightened further. During the late 1990s, for the first time in recent history, severe crop losses and rising agricultural prices had surprised the nation. As the nation reeled and the insurance industry pushed for more federal insurance coverage for natural events, Hurricane Chelsea smashed into the mid-Atlantic in 2003, causing 1500 deaths and $50 billion in estimated damages as far inland as Philadelphia and Washington. This series of events, along with similar weather volatility in other parts of the world, produced turmoil in major global capitals as political leaders struggled with appropriate responses. But far from a "surprise" attack, scientists and meteorologists showed that the stage had been set for some time.

Scientific evidence, based on the latest "complexity" models of atmospheric change, showed that the increased climatic variability was indeed probably the result of greenhouse gas buildup in the atmosphere, principally the release of carbon dioxide (CO_2) from fossil fuel combustion. But scientists remained incapable of making specific predictions about the rate and magnitude of global change, and how such changes might be distributed. For Congress and the Japanese Diet, however, the short-term economic consequences were pretty clear: a decimated insurance industry; major financial losses and weak stock markets; and a need to create large deficits. This combination put the world economy into a mini-tailspin, to say the least. In the U.S., environmental and technological progress slowed as government-led crisis management made things worse before any improvements could take hold. U.S. economic growth dropped to 1.5 percent for the rest of the decade and only slowly started creeping upward by 2020.

ECO-CRISIS

In this future, the onset of global climate change is characterized by increasing weather variability and turbulence, which quickly reaches crisis intensity by the year 2001. This phenomenon is not limited to the United States, as Asia (particularly Japan), Europe and other parts of the globe are hard hit. Following close behind are two nuclear accidents in Europe, which surprise and shock the world. The response in the international community is a realization that closer cooperation, not competition and further fragmentation, are the key to future survival and prosperity. A series of steps, which move beyond strictly environmental concerns to include trade and security, is taken to restructure and ensure a more harmonious relationship between the environment, industrialization, and economic development.

The response in the United States, quite apart from emergency actions, involved a series of measures in 2004 addressing climate change, including:

- Immediately restricting greenhouse gases and other climate change agents, at high cost to many industries.
- Launching a radical, government-sponsored, energy-reducing demand-side management programs.

- Initiating a government-funded research and development program for technologies to reduce climate change agents.

- Extensively promoting and exporting technologies to reduce climate change agents to developing countries, particularly China, to restructure old energy infrastructure.

- Implementing an extensive biomass energy program, including reforestation of some areas and the halting of old growth logging.

- Supporting broader research in long term health, agricultural, and ecological effects of raised CO_2 levels.

Just as parts of the U.S. economy were reviving in 2007 (cyclical versus longer term recovery due to recessionary impact of policy measures), two nuclear accidents effectively eliminated the nuclear option as a workable response to climate changes. In one accident, a severe cold spell in the depth of winter pushed electricity loads to record highs and a reactor vessel head failed in a generation station. These accidents, although shocking, had their greatest effect in convincing U.S. leaders that substituting nuclear power for fossil fuels was not viable.

In the aftermath of the climate and nuclear crises, extensive emergency and longer term policy measures were enacted in the United States, with similar measures being adopted in other countries. While a new global environment summit was being held in 2008 (which, among other things, strengthened the Framework Convention on Climate Change), a "Sustainability Act" was passed quickly by Congress with bipartisan support. Because this comprehensive bundle of sustainability policies was carefully researched during the 1990s as part of an ongoing debate about sustainability, it had the advantage of not being thrown together as a panic measure. The legislation included, among other things, carbon taxes, removal of subsidies for fossil fuels, transition "packages" to assist particular industries, subsidies for wind, solar, and battery storage energy systems, large investments in public transit, various taxes to discourage auto use, and measures to address social equity issues, such as sector job losses.

Various energy sectors were hard hit, with most in transition. Oil prices jumped quickly due to CO_2 taxes, with oil imports declining as a result. Most nuclear power was phased out over a 10-15 year timeframe. Utility deregulation slowed, as government and transition programs took time and resources to implement. Natural gas at rising prices increasingly replaced a significant share of fossil and coal-fired power plant capacity, based primarily on the grounds of efficiency, but with only a relatively small reduction in carbon dioxide emissions. Renewables gained the most, with increased research and development and government support encouraging their growth. A major focus on new technology, research and development, and efficiency was evident throughout the industry, with many companies attempting to diversity assets and expertise.

Transportation and land use problems, however, continued to plague most cities. The sharp rise in fossil fuel costs, along with lower income growth, spurred many upper and middle class families toward pockets of gentrification with better public and private transportation systems, leaving many urban cores behind facing poverty and racial tensions. Income inequality had indeed grown sharper. The irony was that higher fuel costs also improved automobile technology and allowed more vehicle options. Small electric vehicles, though limited in power and range, became popular as short trip vehicles. Super lean burning hybrid vehicles also entered the market fueled partially by gasoline and electric/natural gas components. Motor vehicle use had continued to grow, despite the crises, but at a slower rate.

The effect on the world economy was sobering well into the second decade of the new century, as industrial transitions occurred over time. The world economic growth rate was stuck between 1.5 and 2 percent during the crises, although there was widespread cooperation and consensus on economic stability measures. Population growth, both in the United States and internationally, had slowed. Following the crises, industrialized countries led the way with new measures of growth and prosperity that were less throughput dependent. Most developing countries, however, were stuck in traditional growth paradigms and stubbornly resisted further cooperation; a major difficulty was enforcement and compliance in environmental stabilization programs. This political dilemma between industrialized and poorer countries perplexed leaders and paralyzed closer global economic ties and new institutional arrangements. More regional conflicts, particularly eco-wars, emerged by 2014 as acute environmental degradation ignited resource conflicts. Industrialized countries, including the United States, were not only frustrated but the effects were felt economically with slow growth rates. What was heralded as a new era of economic and environmental harmony at the global summit in 2008 was caught in international bickering and endless talks. A level playing field, let alone full global cooperation and enforcement, did not emerge by 2025.

EARLY INDICATORS OF THIS SCENARIO

- Continuing weather "surprises," for example, hundred year events.
- Droughts in Midwest and parts of the Northwest.
- Crop yields in Midwest declining.
- Record number of forest fires, primarily in the West.
- Increased frequency and severity of hurricanes in Southeast.
- Evidence of decline or distress in various species as a result of climatic pressure.

In late 1997, two major studies emerged linking birth defects and children's health problems with environmental causes. The initial reaction in the United States was shock, then outrage, especially among young families (particularly baby boomers). State and federal government agencies were deluged with questions and requests for more information, and elected officials were put on notice to act. Far from being a surprise, evidence had been building for some time. In the previous two years, for example, more research had started to emerge concerning health-related links to the environment. In one study, U.S. cancer rates were shown to increase for each generation; in another study, in Norway, birth defects were shown to have tentative links to environmental factors. Both of these studies cited exposure to toxins, pesticides, even diet, as possible key determinants. These and other studies, increasingly popularized in the media, had raised public concern. While the birth defect link was only one more example of environmental degradation, somehow it was the final straw for many Americans. A groundswell of talk and latent concern about the environment turned into more conscious action and behavioral changes. Consumer reaction, for example, was surprising: demand for green products and services grew by 24 percent in the first quarter of 1998. Government and business leaders scrambled at first--wondering whether this was just a short-term phenomenon--but additional evidence linking lifestyles, health, and the environment continued to emerge over the next couple of years.

The timing, in retrospect, was fortuitous, as the U.S. economy was poised for significant growth from restructuring. Productivity, technological innovation, and the development of new services from information technology fueled the restructuring. Strong growth in late 1994 set the stage, with traditional exports like manufactured goods growing and the trade balance improving. But by mid 1996, the statistics told a more interesting story: services were exploding and without any regard to familiar trade patterns. Financial, information technology, and education-entertainment services led the charge around the globe. Statistical indicators of a new post-industrial revolution showed sustained growth in overall U.S. productivity by 1997--and clearly highlighted the long hoped for services productivity boost. Other advanced industrial nations tried to follow the U.S. lead, with trade discussions more likely to focus on new technological alliances rather than heated agricultural bashing. By 2004, under the new World Trade Organization, 120 nations signed an international agreement for broad protection of intellectual property rights and information services.

ECO-ECO-TECH

This is a world of increasing environmental awareness linked with a strong U.S. (and global) economy, technological developments, and governmental initiatives to create cooperative "win-win" solutions. Many of the pieces were already in place by the 1990s but much like the advent of personal computers and their promise of increased productivity, the network linkages and timing are key. Other developed countries follow the U.S. lead, but equity disparities slow the rest of the world. Unlike the previous scenarios, this world is driven by the values of the baby boomers, who occupy top management and policy positions and favor market and incentive-based approaches. But as this scenario plays out, not everyone in society benefits from technological changes, and economic and environmental improvements.

Similar shifts were evident in employment statistics as service jobs continued their historic climb. The big difference, however, was that salaries were also rising. The supply of trained workers simply could not keep up with rising service demand, which heightened upward wage pressure (population, including immigration, was still growing in the United States, but this did not translate immediately into more skilled workers). By 2000, the Commerce Department revamped its statistical system, not only to report services trade but also to integrate more environmental full-cost accounting (including natural capital depletion) into national accounts.

Technological innovation, and informational technology in particular, were critical components of this shift. Information technology effectively reframed the utility industry, for example, with California's restructuring of retail electricity markets leading the country, and spot and future price markets for electricity emerging nationwide by 2004. Improved

electricity efficiency reduced costs, expanded uses, and provided more customer choice. The information superhighway made a larger difference than most imagined by 2010, as education "tele-links" and corporate telecommuting networks spanned the nation. Information technology also had a significant impact on transportation; by the year 2000, automated traffic management schemes, such as the intelligent vehicle highway systems, were operating experimentally in Chicago and other major cities, not only to manage congestion but to reduce vehicle emissions. National labs refocused on accelerated research and development programs for environmentally appropriate technologies.

Growing traffic congestion, local government fiscal problems, and continuing air pollution gave many communities incentives to make use of new technologies and various demand-side reforms to improve local transport and land use patterns. Various states were experimenting with replacing property, event income taxes with alternative taxes on gasoline, energy and automobile use. urban redevelopment efforts were trying even more pilot projects, particularly to link transportation, jobs, and housing in various incentive schemes.

Government by the late 1990s was playing a major role as a catalyst and consensus builder. In response to growing environmental awareness, the government restructured its approach to industry and provided new programs and incentives. The emphasis shifted from detailed regulation to sector-by-sector agreements and market-based legislation, including clear targets for pollution reduction. The organizing principle became "level playing fields," which ensured that companies received improved price signals and that they could profit from eco-efficient innovations. Federal technology partnerships, such as the Partnership for a New Generation of Vehicles, with the "big three" auto makers, proved to be a successful model. By 2004, a new era of government and business relations was well under way, which recognized the compatibility of pursuing economic and environmental objectives together. Indeed, these objectives reinforced each other and generated even stronger economic performance in future years.

Improved international relations played a small but important role as the United Nations emerged more fully as an international arbiter and security guarantor. Instead of a world policeman, the U.S. was able to shift into a multilateral partner role in regional conflicts. Many conflicts continued to flare, but a growing world economy defused most with new assistance programs. The largest stumbling block, however, was continued environmental degradation in many parts of the world, such as continuing rainforest lost in the Amazon and widespread desertification in Africa. New international incentives and "carrots" were proposed, but compliance was simply lacking in many regions.

Energy and transportation reflected the changing paradigm of a technologically driven economy, which by being more productive and efficient, was also less dirty. Oil prices remained relatively low (in the $20-23 per barrel range, due to low demand), while government and market incentives pushed natural gas growth, renewables, and other alternatives. A new national gas grid network emerged in the late 1990s, which allowed Compressed Natural Gas-hybrid vehicles to penetrate the vehicle market beyond the use in commercial and government fleets. Electric vehicles were also a growing segment, with California mandates spreading across the country. Competition forced major reconfiguration of the utility industry as independent power producers, relying primarily on natural gas and co-generation, increasingly dominated electric power generation. Coal was still used for most base generation (using clean, gasification systems), while nuclear was increasingly phased out as a result of high costs and large centralized characteristics. Worsening suburban and urban gridlock in the late 1990s spurred adoption of congestion pricing on existing and new roads, smart express high occupancy vehicle energy and more widespread telecommuting. New car designs dramatically reduced vehicle energy consumption after 2000. Car design moved quickly to incorporate elements of the "supercar:" hybrid mechatronic drive trains powered by electricity; "clean" oil-based fuels or hydrogen; and life-cycle production and recycling. New "leapfrog" supercar manufacturers emerged with short product cycles and low overhead to serve consumers who were willing to pay more for new, greener innovations.

By 2010, the American economic-environmental boom had increased the standard of living for most citizens, although many inequities still remained. Instead of using income and wealth as the traditional measures of well-being, the new economy was distinguished by knowledge, information, and environmental quality of life, such as clean air and water. Real wages were increasing for most workers. Total unemployment continued to fall as the number of entrepreneurs and new businesses grew, often out of homes with high-tech linkages. Urban cores and rural areas, however, continued to lag as new "knowledge" skills left many behind. High-tech redefined crime, shifting much of its focus to digital networks, where boundary-less worlds were difficult, if not impossible, to police. In general, the quality of education improved through computer access and worker retraining programs. With universal health care insurance in place by the late 1990s, most Americans were able to increase their "green" spending

and regarded concern for the planet as an investment in their children's future.

EARLY INDICATORS OF THIS SCENARIO

- Continuing health and environmental linkages research.
- A broadening of lifestyle change toward environmental awareness.
- Strong U.S. economic growth, especially in the high technology sector.
- Technological improvements, including breakthroughs.
- Changing government role, particularly as catalyst and consensus builder (including perception).

APPENDIX B
Other Policy Options Considered

The following policy concepts were considered and debated in varying detail by the Task Force but recommendations were not made for a number of reasons. The Task Force also agreed not to make recommendations on policy approaches that are believed to have significant greenhouse gas benefits recognizing the significantly greater analytical resources available to the Presidential Advisory Group on Greenhouse Gas Emissions from Personal Motor Vehicles. Although the advisory group completed its work without issuing a consensus final report, policymakers can refer to the advisory group's docket to make additional recommendations to move the nation closer to transportation goals in this area.

TRANSPORTATION

- Utilize Government Travel Procurement Policy to Establish Markets and Promote Development and Production of Low Emission Vehicles (Market Mechanism).
- Award Government Procurement to Producers of Vehicles Employing New Technologies (Market Mechanism).
- Remove Regulatory Barriers to the Development of New Demand-responsive Para-transit Services (Regulatory Changes).
- Transportation Pricing Reform: Gasoline Tax (Market Mechanism).
- Pay-As-You-Go Insurance (Market Mechanism).
- Transit-Friendly Government Procurement (Market Mechanism).
- Corporate Average Fuel Economy (Regulatory Change).
- Personal Motor Vehicle Miles Travelled & Emission Based Registration Fees (Market Mechanism).
- Commuter Choice (Market Mechanism).

ENERGY

- A Tradable Emission Reduction Incentive for Energy Efficiency and Renewable Technologies (Market Mechanism).
- Biomass Energy Production on Conservation Reserve Program Land (Programmatic/Institutional Change).
- Create a Renewable power Marketing Authority (Programmatic/Institutional Change).
- Electricity Sector Reform (Programmatic/Institutional Change).
- Provide Preferred Access to Government Technology Partnerships and Regulatory Flexibility for Companies that Demonstrate Compliance with Environmental Performance Goals (Market Mechanism and Regulatory Changes).
- Provide Incentives to Assist in Commercialization of Renewable Energy Technologies for Commercial and Residential Application (Market Mechanism).
- Develop Federal Guidelines for Evaluating New Generation and Distribution Resources (Fossil and Renewables) on a Life Cycle Basis Including Externalities from Residual Emissions (Regulatory Change).
- Establish a Market for New Generation Under Whatever Industry Structures Emerge that Rewards Clean Power by Requiring Fuel Price Risks As Well as the Cost of Environmental Controls to be Borne by Investors--Not Rate Payers (Market Mechanism & Regulatory Changes).
- Promote High-Efficiency Fossil, As Well as Renewables and Efficiency, Technologies as "Clean Air Measures" by Establishing Clean Air Act Incentives for These Measures. (Regulatory Change).
- Expand Market for High-Efficiency Fossil, As Well As Renewables and Efficiency, Technologies through Regional Air Quality Programs - e.g. Ozone Transport Commission, NOx Reduction Program, and Grand Canyon Visibility. (Regulatory Change).

- Establish Strict Overall Performance Goals for all Environmental Emissions (e.g. CO_2, NO_x, SO_x, and Toxics per Ton of Product) (Regulatory Changes).

Cross-Cutting Options

- Negotiate International Greenhouse Gas Treaty With Emissions Trading (Market Mechanism).

APPENDIX C
ENDNOTES

1. Executive Order No. 12852, 29 June 1993, amended 19 July 1993, 42 U.S.C. 4321.

2. The President's Council on Sustainable Development, *Sustainable America: A New Consensus* (Washington, D.C., 1996).

3. The World Commission on Environment and Development (The Brundtland Commission), *Our Common Future* (Oxford: Oxford University Press, 1987), p. 43.

4. American Wind Energy Association, *1994 Wind Energy Status Report* (Washington, D.C., 1994), p. 2.

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