

**Protecting Health, Preserving the
Environment and Propelling the Economy:
An Environmental Health Briefing Book**



A 2007 Briefing Book for Members of Congress

Physicians for Social Responsibility

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PREFACE

We have prepared this briefing book on health, the environment and the economy with fifteen summaries of key issues of our time. Written by leading experts in their fields, these summaries take concern for our health as a starting point and review each topic based on the most current science and public health information available. The briefs describe current policies and programs that link health, the environment and the economy and propose policy changes that can optimize improvements in all three areas.

This document is intended to address a diverse set of needs and audiences. Jobs and industries can flourish in a stable environment if they are provided the proper incentives and infrastructure. The problems and measures examined focus on new technologies and new practices that can jump-start infant industries and support the transformation of established ones to catalyze and sustain healthy and stable economic growth. Developing and powering a sustainable society is the critical issue we face in the 21st century.

It is our conviction that there is no better means of reaching the American people about the importance of preserving the environment than to help them understand the catastrophic costs of not doing so for their health and lives, and for the health and lives of their children.

A brief list of references is provided for each section so that the reader may pursue primary sources. E-mail addresses for all authors are listed so that readers may contact authors directly.

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I. CLIMATE CHANGE

- Paul R. Epstein

Overview: Climate Change Science

- In 2001 the United Nations' Intergovernmental Panel on Climate Change¹ reached four main conclusions: 1. Climate is changing, 2. Human activity is contributing, 3. Biological systems on all continents are responding to global warming, and 4. Weather is becoming more extreme.
- Since the 2001 IPCC report we have learned a great deal more: carbon dioxide (CO₂) rise is accelerating; the oceans are becoming more acidic as they absorb CO₂; tropical oceans are becoming warmer and saltier as they evaporate more quickly; surface waters near the North Pole are becoming cooler and fresher from Greenland and Arctic ice melt and more rainfall at high latitudes; and polar and mountain glacial ice is shrinking at surprisingly rapid rates unimagined just five years ago.²
- Climate change (shifting weather patterns) is caused by global warming, which results primarily from build-up of heat-trapping gases from burning fossil fuels.
- The primary reason for the unexpected rate and magnitude of change is that, since the mid-1950s, the oceans have warmed 22 times more than the atmosphere.³ Deep ocean warming is speeding up the global water cycle, contributing to Arctic ice melting, changes in ocean circulation,⁴ and heavier storms and downpours.⁵
- Nine of the warmest years of the past 100 years have occurred in the past ten years, making the past decade the warmest on record since 1861 when thermometer records were begun.
- While precipitation has increased seven percent in the U.S. during the past half century, heavy events (> two inches/day) have increased 14 percent and very heavy events (> four inches/day) have increased twenty percent.⁶
- Loss of polar ice and increases in the heat absorbed by the open ocean and exposed land surface are reinforcing the warming.⁷ For the first time in at least two million years, the earth may have a markedly diminished north polar ice cap; or none at all.
- Changes in the climate system could occur abruptly and non-linearly.⁸ Increasing rates of change, greater volatility, and changes in multiple components of the climate system cause instability, increasing the propensity for reaching "tipping points" that lead to abrupt change.

Health Risks

Global climate change poses multiple consequences for human health. These include:

- Morbidity and mortality from more intense heat waves.^{9,10} The European heat wave of 2003 was six standard deviations from the mean, and records were set in more than 100 U.S. cities during the heat wave of 2006.
- The Netherlands recorded 1,000 extra deaths during July, 2006 and, in the U.S., July's heat wave killed more than 200 people nationwide, including at least 160 in California.
- Illness and death from respiratory diseases, as warming temperatures increase air pollution (smog), and rising atmospheric CO₂ leads to a greater production of allergens, including ragweed pollen and soil mold spores.¹¹ Diesel particles help deliver "aeroallergens" and sensitize lung cells. Asthma, which is exacerbated by these pollutants, has risen four-fold in the U.S. since 1980.

- Dust storms from Africa the size of the continental U.S. are reaching the Caribbean and southern Florida. These global changes, projected to increase with climate change, could contribute further to respiratory disease in the Caribbean and Southern Florida. They also contain soil organisms (fungi) that infect fan coral.
- Warming and/or intensifying weather extremes (more prolonged droughts and heavier floods) help to spread mosquito, tick, rodent and water-borne infectious diseases, including malaria, dengue fever, Lyme disease and cholera.^{12,13}
- Large epidemics of malaria, the most debilitating mosquito-borne disease in the world, often follow floods. The area conducive to Lyme disease transmission is projected to expand in the U.S. Northeast and well into Canada. Mosquitoes are circulating at high elevations in Africa, Asia and Latin America, where plant communities are migrating upward and glaciers are in retreat; expanding the range of mosquito-borne illness.
- Changes in the range of water-borne diseases. As reported by the U.S. Centers for Disease Control and Prevention, infections with *Vibrio parahaemolyticus*, carried by shellfish and previously confined to the Gulf states in the U.S., have occurred for the first time ever recorded in warming waters off Alaska, Washington and New York. In the U.S. outbreaks of water-borne diseases, such as from the bacteria *E. coli* and the parasite *Cryptosporidium*, tend to follow heavy downpours, which are becoming more common with climate change.

Changes to Natural Systems: The Systems that Underlie Public Health

Climate change threatens species and the ecosystems of which they are a part. Human health and livelihood depends on these ecosystems. Examples of how climate change is affecting habitat, animals and plants include:

- Extensive heat-induced bleaching, spread of pests that rely on warmer waters, contamination and over-fishing have killed twenty-six percent of coral reefs and sixty percent are threatened.¹⁴ Coral reefs are the tropical rainforests of the oceans and contain forty percent of known marine fish species and species that hold medicines for humans.
- Acidification of the oceans because of rising CO₂ levels will affect the integrity of coral reefs and all marine life with shells.
- Warmer water promotes harmful algal blooms (“red tides”) and marine “dead zones,” environments incapable of supporting most life forms, such as the one on the U.S. Gulf Coast that has grown to be as big as the state of New Jersey. Diseases promoted by warm temperatures are diminishing oyster populations all along the eastern coast of the US. Loss of oysters and other filtering bivalves affects nutrient levels and encourages further growth of harmful algal blooms. Harming our coastal zones affects the health of humans, fisheries, the seafood industry and tourism.
- Warming temperatures and drought contribute to the loss of wetlands, the increased salinity promoting the growth of wetland plant-devouring snails. Loss of wetlands is a leading cause of species extinction.
- Agriculture is particularly vulnerable to increased temperatures and greater climate variability. Excessive heat, extreme droughts and flooding, and climate change-driven spread of crop diseases and pests, are already exacting a heavy toll on crop yields.
- The lumber industry faces direct threats from wildfires and pest infestations, such as the bark beetles besetting pine forests from Arizona to Alaska. Warming favors over-wintering, movement to higher altitudes and latitudes, and allows beetles to reproduce extra generations

each year. Meanwhile, prolonged droughts in the US West have weakened tree defenses, drying the resin that drowns the beetles as they try to bore through the bark.

- Many of the impacts of climate change (e.g., loss of coral reefs and forests – essential habitat) could occur abruptly and non-linearly.¹⁵

The Rising Costs of Inaction

- The energy sector, including the public utility sector, is particularly vulnerable to climate change, storms, heat waves and melting tundra.
- Economic damages from natural catastrophes – overwhelmingly weather-related – have risen 50-fold since the 1970s. Costs rose from \$4 billion/yr 1950s-1980s, to \$40 billion a year in the 1990s, then again to \$145 billion in 2004 and \$225 billion in 2005.¹⁶
- The overwhelming majority insured disaster losses in 2005 were caused by hurricanes and windstorms from the Atlantic Ocean, where the changes in ocean temperatures, pressure gradients and winds are most closely associated with climate change. The percentage of insured losses has tripled as more weather disasters hit Europe, Japan and the U.S. Insured losses for 2005 reached \$83 billion (200 times the insured losses in the 1980s).
- The financial sector has been the first to respond to the rising costs of inaction by raising premiums and exclusions. Some insurers, bankers and investors have begun to examine public policies that could enable the large shift in investments needed to propel the clean energy transition.

Current Policy

- The U.S. Government has not taken seriously the opinions of its own EPA scientists, the National Academy of Sciences, the American Geophysical Union, the World Meteorological Organization, and the world scientific community (the IPCC) concerning dangers that global climate change poses for physical and biological systems, human health and economic stability.
- The U.S. agreed to the UN Framework Convention on Climate Change but has refused to sign the Kyoto Protocol. While encouraging voluntary measures, the current administration has failed to develop a coherent set of policies aimed at significantly reducing GHG emissions.
- Instead, the U.S. Government has continued to provide large subsidies for oil and coal exploration and to block efforts to improve energy efficiency in U.S. vehicles, industry, appliances and homes.
- The current U.S. Government has provided minimal economic incentives and no clear guidelines (regulations and standards) for U.S. industries to develop alternate sources of energy. As a result, U.S. companies (such as GM and Ford) are losing competitive advantage in rapidly growing world markets concerned with greater efficiency and clean energy technologies.
- The energy sector itself is vulnerable to interruptions from storms, heat waves and melting tundra.
- By not reducing the U.S. dependence on oil, the current administration has left North Americans and the U.S. economy highly vulnerable to instability in the Middle East, South America, and Africa.

Recommended Proposals

The U.S. should become the recognized world leader in efforts to reduce greenhouse gases (GHGs) by:

- Supporting U.S. ratification of the Kyoto Protocol and taking a leadership position in the international community to ensure its implementation.
- Selecting new clean energy technologies, such as distributed generation (DG) systems (e.g., solar, wind, wave and geothermal), that feed into grids, provide adaptation in the face of more severe storms and heat waves, and offer primary prevention by reducing GHG emissions.
- Evaluating the “life cycle analysis” of proposed technologies, for their health, environmental safety and economic feasibility.
- Rapidly adopting ‘no-regrets’ measures that have multiple co-benefits. These include:
 - Doubling CAFÉ (Corporate Averaged Fuel Efficiency) standards for automobiles.
 - Providing producer and consumer incentives for “smart technologies” for the grid, hybrid vehicles, and hybrid technologies (such as combined manufacturing and heat capture).
 - Adopting procurement policies that help create markets for the new technologies.
 - Promoting “green” buildings.
 - Improving public transport systems.
 - Promoting “smart growth” of urban and suburban communities to reduce transport.
 - Increasing local food production to reduce transport costs and GHG emissions.
 - Promoting natural carbon sequestration in forests (with high diversity) that also preserve habitat and species and promote forest products that can provide nutrition and support livelihoods.

A new clean energy plan is needed, along with bold incentives, standards and regulations, to rapidly change the nation’s energy diet. The U.S., with new local and Congressional leadership, can play a central role in advancing international cooperation to make the clean energy transition a “win-win-win” for energy, the environment and the economy.

II. SPECIES LOSS AND ECOSYSTEM DISRUPTION

- Eric Chivian, Mary Berlik, and Stuart Pimm

Overview: the Science and Human Health Impacts

Loss of species and disruption of ecosystems

- The U.S. boasts the greatest variety of mammals of any temperate country as well as one of the richest flora, and has the most diverse natural habitats of any country on Earth.¹⁷
- Species extinctions worldwide are now occurring at rates 100-1000 times pre-human levels. In the U.S., Hawaii, California, and Alabama have lost the most species.¹⁸
- Habitat destruction, invasive species, pollution, over-exploitation, and increasingly climate change, all the consequences of human activity, drive these extinctions.¹⁹
- The loss of habitat, the most important present contributor to species loss, results from a variety of activities, including: deforestation, the draining of wetlands, the building of dams, and the destruction of coastal marine environments.

- Species loss can disrupt ecosystem functions, which are the goods and services that support all life on Earth, including human life. Examples include the purification of air and water, and the breakdown and recycling of organic matter.
- We know little about the number, type or combination of species that make ecosystems work. As a result, we cannot accurately predict how shrinking populations, even in the absence of outright extinctions, may compromise their functions.

The implications for human health

- Nature is the ultimate source for about half of the most prescribed drugs in the U.S. and provides the basis for most new drugs.^{20,21} Thus, species loss may foreclose the discovery of important new medicines.
- Among the many life-saving drugs designed by Nature are Taxol, originally found in the Pacific Yew Tree, and a key drug in treating ovarian, breast, and certain lung cancers; and AZT, originally derived from a Caribbean sponge, and a principle treatment for HIV.
- We may also be wiping out species that provide invaluable medical research models, like the polar bear. Endangered by the global warming-driven melting of arctic ice, polar bears produce a substance that may prevent and treat osteoporosis and end-stage renal disease, conditions that have largely eluded effective treatment and which together cost the U.S. economy over \$35 billion a year.^{22,23}
- Cutting down forests may disrupt natural biological controls that keep human infectious diseases in check. For example, fragmented forests in New England tend to favor populations of the white-footed mouse, the principal reservoir for Lyme disease, the most prevalent vector-borne disease in the U.S., with more than 20,000 cases reported each year.
- Many cities around the country, including New York and Los Angeles, rely on natural watersheds to purify their drinking water. When we degrade watersheds, we jeopardize the function of this essential service.

Current Policy

Current policies have undone longstanding safeguards that protect streams, valleys, and their wildlife from destruction by coal mining and drilling

- The Interior Department has proposed discarding a Reagan administration rule, designed to protect water quality and freshwater species, that prohibited mining within 100 feet of a stream, and has repealed a 25-year old prohibition against dumping mining waste into rivers and streams.
- The administration favors drilling on federal lands over critical conservation needs. For example, it approved more than 75 percent of the energy industry's applications to work in winter wildlife ranges, endangering wildlife in those areas.

Dismantling the nation's most important wetlands protection law, the Clean Water Act

- The administration has removed an estimated 20 percent of the contiguous 48 states' remaining wetlands from protection under the Clean Water Act. New wetlands policy, which relies on already existing voluntary programs, does little to protect these vital ecosystems, which purify water and control floods.
- The requirement that every acre of wetland filled in or destroyed be replaced with at least one acre of new wetland has been repealed.

Changing rules to allow the destruction of ancient forests and their rare wildlife species

- Protections for more than nine million acres of Alaska's Tongass National Forest and five million acres of Alaska's Chugach National Forest have been removed. Because of these rule changes, 50 planned logging projects threaten to spoil some of the last and largest pristine rainforests in the U.S. that provide habitat for a wide range of wildlife.
- Under new rules, agencies no longer need to survey for or protect rare species before logging in old growth forests on federal lands in the northwest. These rules sabotage the Northwest Forest Plan, a nearly decade old compromise designed to slow clear-cutting of old growth forests.
- The administration has introduced the "Biscuit Fire Recovery Proposal," which proposes logging 20 times greater than the normal take from the Siskiyou (an area of global botanical significance) and the Rogue River National Forests.

Rolling back protections for endangered plants and animals

- The current administration contests the assertion that human activity causes today's high rate of species extinction,²⁴ despite otherwise unanimous world scientific opinion.
- Only 31 species have been listed as endangered during the current administration. In contrast, the Clinton administration averaged 65 per year, and President George H. Bush 59 per year.

Recommended Proposals

Better policy would:

- Enforce existing laws, such as the Clean Water Act and the Endangered Species Act that protect our nation's species and their habitats.
- Not tolerate destructive mining, drilling or logging practices near rivers and streams, in ancient forests or in critical habitats that harbor rare and endangered wildlife.
- Since a majority of endangered species live *only* on private lands, good policy would seek win-win solutions for private landowners by providing attractive incentives that help them both to manage their land and to protect endangered species.

Our nation's great natural habitats and the diversity of species that live in them are a treasure that we cannot afford to squander. This would be morally wrong and would endanger our health and the health of future generations.

III. AIR POLLUTION

- Joel Schwartz and Joseph Ladapo

Overview: the Science and Human Health Impacts

Particle air pollution is the biggest and most pervasive air pollution risk humans face.

- Most particles originate from coal burning power plants or from diesel and gasoline combustion in engines.
- Two U.S. studies and one Dutch study found a strong association between particle air pollution and early death, with an estimated 200,000 Americans dying prematurely each year as a result of particles.^{25,26,27}
- Most of these individuals die from lung cancer, cardiac disease, and respiratory illnesses.²⁸

- Particle air pollution also has been linked to asthma, bronchitis, and poor lung function, with exposure spread unevenly across the country.^{28,29} Southeastern states suffer the highest concentrations of these particles, and residents there have the greatest risk of dying from particles emitted by power plants.

Ozone air pollution also has been linked to health problems and poses a special risk to children.

- “Good” ozone occurs naturally miles above the Earth in the stratosphere. “Bad” ozone occurs at ground level (troposphere) and can be formed from industrial emissions and gasoline vapors.²⁹
- Ozone air pollution is a respiratory irritant, and its concentrations peak in the afternoon and in the summer, the two times when children most often play outside.
- Ozone air pollution also has been shown to reduce lung function and trigger asthma attacks.³⁰

The other air pollution players: nitrogen oxides, sulfur dioxide, carbon monoxide and lead.

- All four of these are common air pollutants and are mainly products of fuel combustion, except for lead. Industrial metal processing is now the major source of lead air pollution because of the phase out of leaded gasoline in the U.S.
- Lead has been shown to cause brain damage, behavioral disorders and learning deficits in children.³¹
- Nitrogen oxides, sulfur dioxide and carbon monoxide are associated with decreased lung function.²⁹

Current Policy

Undermining legislation designed to reduce air pollution and improve human health.

- The Clean Air Act of 1970 and its New Source Review provisions of 1977 require pollution controls on coal burning power plants, and best-available pollution control devices whenever plants undergo modifications and expansions. The provisions apply to old and new plants.
- New Source Review rules, allowing plants to pollute indefinitely, have been relaxed. Though a court has suspended this policy change, the New Source Review rules are not currently (1/06) being enforced.

The “Clear Skies” initiative jeopardizes future air quality and the nation’s health.

- Policies suggested in the administration’s Clear Skies initiative would require present reductions in pollution by coal burning power plants, but then free these plants from future reductions.
- By freeing plants from further reduction obligations, the nation is left with no recourse for addressing future and emerging air particle pollution challenges, especially should more stringent guidelines prove necessary.
- The reductions that would be achieved by Clear Skies pale in comparison to what would be achieved by simply enforcing the current Clean Air Act. A recent report, for example, compared Clear Skies to the Clean Air Act and found that **an estimated 4,000 additional premature deaths** would occur each year if Clear Skies standards were used instead of those of the current Clean Air Act.³²

The Current Administration has ignored the environmental threat posed by diesel engines.

- Current vehicle emission guidelines for diesel engines only apply to new engines; no retrofits are required.
- Because diesel engines can last for up to 40 years, turnover is slow. These engines also are rebuilt every five years or so, and this maintenance affords ample (and missed) opportunities to retrofit older engines.
- Though some states are pursuing retrofit laws, the lack of a national retrofitting effort will result in unnecessary deaths during the life of these older engines.
- Major American and European automakers are pushing diesel powered passenger cars and SUV's to meet fuel economy goals. But even with the new emission standards, these engines are dirtier than gasoline engines.

Recommended Proposals

- Enforce New Source Review provisions and reduce sulfur dioxide emissions under the framework of the Clean Air Act.
- Design and implement retrofit guidelines for diesel engines.
- Support policies that encourage hybrid vehicle purchases instead of diesel engine vehicles, thereby increasing fuel economy while reducing emissions of particles and compounds that form ozone.

IV. DRINKING WATER CONTAMINATION

- Timothy Ford, Robert Morris, and Aaron Bernstein

Overview: the Science and Human Health Impacts

The American drinking water supply and its current status

- More than 250 million Americans receive drinking water from about 60,000 public water systems. Each American drinks approximately 80 gallons of water per year treated by these systems.³³
- The U.S. has been blessed with adequate drinking water supplies in a world that has severe shortages. However, rapid population growth in the arid West already is straining water supplies, particularly in areas dependent on ground water.
- The U.S. public water infrastructure was built mostly in the late 19th and early 20th centuries and in many places has not been upgraded or even maintained. Water treatment plants were designed to stop cholera and typhoid, but they have proven less effective against emerging human pathogens and have little or no capacity to remove chemical contaminants.
- The EPA categorized 69 percent of the pipes that carry the nation's water supply as being in "excellent" condition in 1980 and only two percent as "very poor". In 2020, without renewal or replacement of existing pipes, the EPA projects that only 33 percent will be in excellent condition and 23 percent very poor.³⁴
- Many large water districts including New York, Boston and Seattle do not filter their water, relying instead on protecting their watersheds. Many significant questions remain unanswered about the adequacy of this approach.

- Other water districts have little or no control over their watersheds and must treat polluted water from sources such as the Mississippi, Missouri, Potomac and Ohio Rivers for human consumption. This approach makes the failure of the water treatment plants a potential catastrophe.

Water infrastructure deterioration and inadequate oversight of drinking water quality threaten public health.

- The Safe Drinking Water Act authorizes the U.S. EPA to set drinking water standards for public systems, but then delegates authority to each state to enact its own programs (except for those in Washington D.C. and Wyoming, which the U.S. EPA runs). No ongoing oversight of these standards exists for the 40 million Americans who take water from private wells.
- Because of old, corroding pipes, almost ubiquitous lead solder and unnecessarily corrosive water, approximately 2.5 million Americans drank water that contained dangerously high concentrations of lead in 2003.³⁵ In January, 2004, at least 23,000 homes in and around Washington, D.C., received water with unsafe lead concentrations.³⁶
- Contamination of source waters and treated drinking water with microorganisms also is widespread.³⁵ Surveillance for waterborne disease in the U.S. by the CDC fails to capture the majority of these contaminants, which are estimated to cause millions of cases of mild to moderate gastrointestinal illness each year.^{37,38}
- The largest waterborne disease outbreak in U.S. history occurred in Milwaukee in 1993 when *Cryptosporidium* afflicted 403,000 people and caused at least 69 deaths, mostly in people with weak immune systems.^{39,40} *Cryptosporidium* is resistant to customary disinfection with chlorine,⁴¹ but can be removed through filtration or treatment with ozone.
- MTBE has been found in drinking water from all 50 states⁴² and makes water taste like turpentine and thus undrinkable at very low concentrations (40ppb). MTBE is toxic and some evidence suggests it may cause cancer, although this remains an open question.
- Other drinking water pollutants found nationwide that can cause serious health problems include nitrates, pesticides, radio-nuclides (radon)³⁵ and the toxic by-products of chlorine-based chemicals widely used to disinfect water.
- 85 percent of drinking water systems serve less than 3,300 people, and supply ten percent of all people who receive drinking water from public treatment facilities. Located mostly in rural areas and staffed by poorly trained or untrained operators, these facilities are ill-prepared to address major risks to drinking water supplies from various contamination sources, especially agriculture. Such circumstances led to an *E. coli* outbreak in Walkerton, Ontario in May 2000 that made more than 2,300 of its 4,800 residents sick and killed seven.⁴³ This outbreak should serve as a model of what could happen in the U.S.

Current Policy

The present administration has ignored and even suppressed information about major problems in the nation's water supply and by doing so has put the health of the American people at risk.

- The EPA repeatedly has misled the public about drinking water quality. An EPA audit revealed that 77 percent of known monitoring and reporting violations and 35 percent of known health standard violations have been omitted from the EPA's database. Moreover, the EPA's own records document that the number of people affected by drinking water violations rose from 19 million in 2002 to 35.5 million in 2003.³⁵ Despite these facts, EPA officials continue to claim that water quality is improving.⁴⁴

- In February 2004 the EPA reversed a Clinton-era decision to ban MTBE. Following that decision it was noted that producers of MTBE gave more than \$1 million to the Bush presidential campaign in 2001.⁴⁵
- The administration supported exempting MTBE manufacturers from liability for MTBE contamination of drinking water. The water industry, state and local governments, and 42 senators all opposed this exemption, which would have put the burden on millions of consumers and their water utilities in 25 states to pay billions of dollars to clean up MTBE.⁴²
- In early 2001, the administration withdrew a Clinton era proposal to reduce drinking water exposures to arsenic (a carcinogen). The administration re-issued the proposal within a year because of public pressure and after a National Academy of Sciences report concluded the EPA had underestimated the risks of arsenic exposures.

Recommended Proposals

- Develop an aggressive program in drinking water research centered on monitoring and treatment technologies, as well as on public health.
- Paying the true cost of water would promote needed conservation of our nation's water supply and at the same time provide necessary funds to fill the \$11 billion annual funding gap for restoration and improvement of infrastructure.³⁴
- Water can and should be subsidized for those who cannot afford it.
- Improve education and training for both the consumer and the water provider, including operators, managers and regulators to ensure the safety of the public drinking water supply.

V. FOOD SAFETY

- Michael McCally

Overview: the Science and Human Health Impacts

In general, Americans have access to safe, high quality foods. Oversight of the American food supply works to ensure that foods are free of disease producing organisms, pesticides and other contaminants, but these and other concerns still pose significant risks to our food supply.

- Although an estimated 75,000 persons contract food-borne and other diarrheal illnesses each year, food poisoning cases have declined by 42 percent since 1996, and *E. coli* infections, one of the most serious food-borne illnesses, have decreased by 36 percent from 2002 to 2003. These decreases are because of effective government inspection programs and increased consumer awareness.
- Pesticides in the food supply remain a threat to health and the development of children. The Food Quality Protection Act of 1996 is progressive and potentially effective legislation that, if fully implemented, will protect our health from potentially harmful contaminants.
- Antibiotics in the food supply are a serious problem. The majority of antibiotic use in the U.S. is not to treat human infection but to promote weight gain in livestock. The overuse of antibiotics in food production puts people at greater risk of infection with antibiotic-resistant, life-endangering infections.
- The introduction of genetically modified foods (GM foods) has produced intense international debate about their human health and environmental effects. GM foods may contain new human allergens or new toxic substances, though studies of these problems remain

inconclusive. GM organisms, such as salmon, bred to grow faster and larger than their wild relatives, pose a threat to ecosystems as potential invasive species. GM crops grown with the herbicides that they have been designed to be resistant to have been shown to decrease biodiversity in agricultural ecosystems more than their conventionally grown cousins.⁴⁶

- Food irradiation is controversial. Although many medical and public health organizations with industry encouragement support the use of irradiation to kill food micro-organisms,^{47,48} strong arguments can be made against this technology. Many studies have shown worsened taste and potential adverse health consequences from eating irradiated foods, which contain novel carcinogens, such as 2-alkylcyclobutanones (2-ACB's).⁴⁹ The EU recently voted to deny expansion of food irradiation pending further study of 2-ACB's. A majority of Americans oppose food irradiation, and some school districts have adopted policies prohibiting its use.⁵⁰
- The agriculture industry and the domestic food supply are potential terrorist targets.^{51,52} Before the 2001 anthrax mailings there had been one case of bioterrorism in the United States. In 1984, 751 persons were made ill when members of a religious cult infected salad bars with *Salmonella* in ten rural Oregon communities.

Present Policies

The administration has catered to the interests of industry instead of American citizens and undercut many safeguards in the food supply chain.

- The current administration is supportive of calls from the food irradiation and nuclear industries to greatly augment the use of irradiation to prevent food-borne illness.^{47,48}
- The administration has increased funding for the U.S. Department of Agriculture (USDA) through the Bioterrorism Protection Act of 2002, and shifted the USDA Animal and Plant Health Inspection Service to the Department of Homeland Security. The Administration's focus on food bioterrorism risks compromising present, effective, food safety programs.
- The administration has consistently dismissed human health and environmental concerns about GM foods and insists on free trade of food containing these materials. In September 2003, the Cartagena Protocol on Biosafety went into effect with the backing of 57 nations and the European Community. The Protocol seeks to protect biological diversity from the potential risks posed by GM organisms by establishing disclosure standards for exporters and allowing signatory countries to reject shipments containing GM foods. Despite significant concessions made by signatory countries, the U.S. still has not signed the Protocol.
- The EPA, under pressure from the meat processing and pharmaceutical industries, as well as a co-opted veterinary medicine establishment, has not pressed for reductions in the use of antibiotics in livestock, despite widespread concerns voiced by the medical and public health communities that such use may lead to greater antibiotic resistance. It took the joint efforts of health and environmental advocacy organizations to convince one antibiotic manufacturer and some poultry producers to stop using one family of antibiotics, the fluoroquinolones, for domestic livestock. (The fluoroquinolones are a family of highly potent antibiotics to which some pathogenic bacteria, like that which causes Anthrax, have not yet developed resistance).

Recommended Policies

Sound, consumer-focused, food policy would:

- Oppose rapid expansion of the food-irradiation industry. Such an expansion would require construction of many new and costly irradiation facilities. These facilities contain potent radioactive materials that are a major occupational hazard for those who work in them.

Further concerns stem from the transportation and disposal of radioactive waste they generate and from terrorism. No public health research demonstrates that food irradiation is effective in reducing the community incidence of food-borne illness. Given safer, cheaper, and more effective alternatives to ensure food safety,⁵¹ large scale food irradiation should not proceed without further study about its safety and effectiveness.

- Ensure that antiterrorism priorities do not compromise the routine and successful food quality protection programs.
- Develop public-private programs to minimize agricultural antibiotic use, including education that discourages the practice of raising livestock in crowded feedlots and chicken houses. The use of certain antibiotics, like the fluoroquinolones, that are critical to human medicine should be banned outright for use in livestock given the dire consequences if pathogens were to become resistant.
- Sign the Cartagena Protocol and promote trade policies that acknowledge the potential environmental and human health hazards of GM foods and that respect rights of other nations to accept or reject importation of such food.
- Require that all GM foods be labeled as such.
- Fully implement the Food Quality Protection Act to protect the American people, especially infants and children, from being exposed to potentially toxic chemicals.

VI. TOXIC SUBSTANCES

- Ted Schettler

Overview: the Science and Human Health Impacts

There are widespread exposures to chemicals and limited data on their safety.

- Studies of the U.S. population conducted by the CDC show that Americans are exposed to a wide variety of toxic chemicals, including carcinogenic polycyclic aromatic hydrocarbons (byproducts of fossil fuel combustion), pesticides, PCBs, and dioxins.⁵³
- National survey data reveal that many Americans have body burdens of several pesticide residues at unsafe levels, with children often carrying the heaviest burdens.⁵⁴
- A large majority of non-pesticide industrial chemicals have not undergone even basic toxicity screening.⁵⁵ A voluntary chemical industry program intended to supply safety data for high production volume chemicals is lagging and major data gaps remain.⁵⁶

Exposure to many human-made chemicals, which can occur at home or school, in the community or the workplace, increases the risk of developing a variety of serious diseases.

- Parkinson's disease has been found to be more common among people with exposure to certain pesticides.⁵⁷
- Non-Hodgkin's lymphoma occurs disproportionately in individuals with exposure to herbicides, pesticides, dioxins, and PCBs.⁵⁷
- Heart attack risk and risk of sudden cardiac death are elevated in people with higher mercury body burdens.⁵⁸
- Exposure to agricultural chemicals may lower sperm counts,⁵⁹ which in some areas of the US have declined significantly, resulting in sub-fertility or infertility.⁶⁰

Exposure to environmental agents during critical periods of childhood development can cause diseases and disabilities that last a lifetime.

- Permanent harm may result from only small exposures, particularly when the agent disrupts hormone function (e.g., endocrine disruptors such as PCBs or dioxins) or signaling molecules that direct critical developmental processes.
- Prenatal exposure to mercury interferes with brain development that can lead to deficits in attention, memory, and language skills.⁶¹
- Some pesticides and solvents in consumer products, also used in industry, increase the risk among those exposed of having children with birth defects.⁶²
- Abnormal development of the reproductive tract can result in malformations, infertility, and potentially increased risk of testicular cancer. These changes have been plausibly linked to prenatal exposure to toxic chemicals during development.⁶³

Current Policy

The Superfund program

- In 2002 EPA cleaned up 39 sites, the fewest since 1991. The number of new cleanup sites has dropped 21 percent per year between 2001-2003 compared to the yearly average from 1993-2000.⁶⁴
- The Administration has opposed reauthorizing the Superfund tax on chemical and petroleum companies and has thus shifted the cost burden to taxpayers.⁶⁴
- The absence of tax revenues has left the Superfund program operating with 36 percent less money than a decade ago and has made the Superfund trust insolvent.⁶⁴

Lobbying against REACH

- The European Union has developed the REACH initiative (Registration, Evaluation & Authorization of Chemicals) that would require chemical manufacturers to provide safety data about chemicals they produce and give the EU the authority to ban hazardous chemicals.
- Officials from four US federal agencies – the State Department, the U.S. Trade Representative, the Commerce Department, and the EPA – have engaged in a variety of activities to build opposition to REACH, including assigning industry representatives to coordinate the lobbying of specific countries.⁶⁵

Failure to adhere to the Clean Air Act standard of using the best available technologies to limit mercury emissions.

- U.S. power plants and other industrial facilities emit more than 150 tons of mercury into the air each year.
- Rather than protect the public from this persistent hazard, the Bush administration plans to allow nearly seven times the mercury pollution from coal-fired power plants than would be allowed if mercury were to be regulated like other hazardous air pollutants, and to give industry decades longer to comply with these lower standards.
- Because of strong opposition to the proposal, the EPA has extended the time available for public comment.

Persistent Organic Pollutants (POPs)

- The Stockholm Convention, signed by the US but not yet ratified by Congress, bans the production or use of twelve persistent toxic chemicals and provides for the addition of new POPs to the Convention, subject to a rigorous scientific review process.
- The Bush administration has sought to undermine the Convention by proposing legislation that would deny the U.S. EPA authority to control POPs that are added to the treaty.⁶⁶

Recommended Policies

- Support domestic policies that mirror REACH: require pre-market safety testing of chemicals and, on a strict timeline, post-market safety testing of currently used chemicals for which safety data are inadequate.
- Ban or otherwise restrict all products that are *certainly* or *probably* carcinogenic, mutagenic or toxic to reproduction or development in humans, as specified by competent international scientific authorities and organizations.
- Encourage and support research initiatives that lead to the development of chemicals and chemical processes (so-called “green chemistry”) that reduce or eliminate the use and generation of hazardous substances.
- Substitute safer alternatives whenever possible for all chemicals that constitute a significant threat to the health of humans and other species, without waiting for definite proof of an epidemiological link, so as to anticipate and avoid serious and/or irreversible harm. Such chemicals can be identified using the criteria of: persistent, bio-accumulative, and toxic (PBT), or very persistent and very bio-accumulative (vPvB).
- Fully fund the EPA’s endocrine disruptor screening and testing program to ensure that chemicals will be evaluated for health hazards before they are widely disseminated into the environment.
- Insist on neurodevelopmental toxicity testing for chemicals suspected to be neurotoxins in order to protect the brains of developing children.

VII. ENVIRONMENTAL JUSTICE

- Michael McCally

Overview: the Science and Human Health Impacts

There is a large body of evidence that poor and minority communities in the United States and around the world are disproportionately exposed to environmental hazards.

- Race is associated with increased exposure to environmental hazards independent of class and income, including: air and water pollution; landfills, incinerators, and Superfund sites; lead in drinking water and paint; and pesticides.^{67,68,69}
- Three out of five African Americans live in communities with abandoned toxic waste sites. Lead poisoning affects 3-4 million children in the United States. The majority of these children are urban-living African-Americans and Latinos. Moreover, half of Native Americans live below the poverty line, and 100 percent of all U.S. uranium mining and 40 percent of the largest coal strip mines are on Native American reservations.^{70,71}

- The effects of environmental degradation (ozone depletion, global climate change, deforestation, loss of biodiversity) are borne primarily by poor populations and people of color in developing countries on all continents.
- Some of the deforestation and loss of biodiversity in developing countries is the result of demand for these resources by industrialized countries (e.g. gas and oil, tropical hardwoods, coffee, tropical fish and exotic birds), and of efforts to pay off their debt to industrialized country lenders; other losses come from agricultural expansion and over-exploitation of wildlife, secondary to a growing need to feed rapidly expanding populations.⁷²
- In the case of stratospheric ozone depletion and global climate change, developing countries are largely the victims of the behaviors of industrialized countries. The "environmental injustice" is beyond measure when sea levels rise as a result of ocean warming from greenhouse gas emissions. This threatens the existence of small Pacific island nations like Tuvalu. The US is the greatest cause of global climate change of any nation on Earth, producing 25 percent of the world's greenhouse gases while having only four percent of its population.
- Global climate change disproportionately affects poor populations and people of color in our own country as well, an effect that is likely to increase greatly in coming decades. Poor urban dwellers in minority neighborhoods have the highest morbidity and mortality from heat waves and the greatest exposures to urban air pollution worsened by these events.

Current Policy

The current administration has given no indication that it understands or intends to pursue environmental justice programs or policies.

- The EPA has not implemented the Executive Order on Environmental Justice (#12898) as written by President Clinton in 1994 and has failed to provide adequate protection to minorities and low-income families who are disproportionately affected by pollution, according to the agency's own Inspector General.⁷³
- The Inspector General's Report further concludes that the administration in 2002 reinterpreted the Order – without having had any authority to do so – so that it provided environmental justice for “everyone”, thereby sabotaging the focus on low-income minority populations.
- The administration continues to demand that developing countries share in pollution and greenhouse gas reduction efforts, but has refused to accept our own country's responsibility in contributing to these problems, or to make concrete commitments to provide resources to developing countries, both financial and technological, so that they can help solve them.

Oil and Environmental Justice: A Life Cycle Analysis

- From extraction to combustion, oil takes an enormous toll on the environment and on public health, and the impacts fall disproportionately on poor nations and poor and minority populations within developed nations
- Exploration for oil, via road construction and penetration into unexplored forested areas (e.g., in Ecuador), has introduced infectious diseases into isolated, indigenous populations.
- Exploration and extraction, via oil leaks and spills into river deltas (Nigeria) and permafrost (in Alaska), contaminate fisheries, water supplies and disrupt wildlife. ‘Muds’ from off-shore drilling sites (e.g., in the Gulf of Mexico) contain mercury (a neurotoxin) that contaminates fish and harms the humans that consume them. Coal-fired plants emit mercury that enters

ground water, waterways and fish. Combustion generates a wide spectrum of environmental and public health ills – acid rain, air pollution and climate change.

- Poor populations are especially vulnerable due to the exposures and inadequate access to health care. Oil refineries are most often located near African-American and Native American populations in the U.S. The cancer-causing chemicals (e.g., benzene) released primarily affect those living in close proximity to the facilities.
- Inner city populations suffer most from concentrated air pollution -- soot and ozone – and asthma rates are especially high along inner-city truck and bus routes.
- The combined impacts of air pollution, aeroallergens and climate change affect growing children, and these health impacts disproportionately affect poor and minority groups.
- Heat waves take a disproportionate toll on those living in poor housing lacking air conditioning, and those with adequate social supports. The majority of those affected during the 1995 heat wave in Chicago, for example, were African-Americans living in substandard housing.
- Extreme weather events (such as the 1998 Hurricane Mitch in Honduras, killing over 10,000; severe storms and flooding in 1999 in Venezuela, killing 20,000 and leaving 150,000 homeless; and extensive floods in 2000 in Mozambique) take their greatest toll on poor nations with inadequate resources for recovery (IPCC, 2001). Poor nations are especially vulnerable to disasters, lacking adequate resources for coping, adaptation, rebuilding and prevention.

Recommended Proposals

Sound culturally-sensitive policy will be committed to enforcing existing environmental justice legislation and to taking a leadership role in international environmental agreements including:

- Strengthening and enforcing the requirements of Executive Order #12898
- Fully implementing Title VI of the Civil Rights Act of 1964 that prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance.
- Reaching out to the members and leaders of community environmental justice organizations. Almost every community in the United States has at least one environmental issue and a community-based organization working on it.
- Implementing existing EPA action plans to integrate environmental justice into all EPA policies and activities and expanding the EPA Office of Environmental Justice to this end.
- Appointing environmental officials with a demonstrated commitment to environmental protection and environmental justice.
- Assuming a leadership role in international environmental justice; for example by sending the Kyoto Protocol to the Senate for ratification and by implementing the protocol of the Treaty on Persistent Organic Pollutants (POPs).

VIII. ENVIRONMENTAL THREATS TO CHILDREN

- Philip Landrigan and Leo Trasande

Overview: the Science and Human Health Impacts

Chronic diseases of environmental origin are an increasing problem among our nation's children.

- Asthma has become the most common chronic disease of childhood and child asthma prevalence has more than doubled in the U.S. during the past decade.⁷⁴
- Since the 1970's, the proportion of overweight children between the ages of 6-19 has tripled, leading to dramatic increases in Type II diabetes and other disorders.
- ADHD and developmental disorders collectively are estimated to affect 17 percent of all school children – nearly one in every five. Autism rates in America continue to increase more than 20 percent a year.
- Cancer is the second leading cause of death in children. The prevalence of childhood brain cancer has increased by almost 40 percent from 1973-1994.⁷⁵

A growing body of evidence demonstrates that some environmental pollutants are linked to serious health and developmental problems.

- Lead, mercury, polychlorinated biphenyls (PCBs), and some pesticides have been shown to cause brain damage and to contribute to learning and behavioral disabilities in children.⁷⁶
- A recent National Academy of Sciences study⁷⁷ suggests that almost one third of developmental disabilities in children, including dyslexia, attention deficit disorder, and mental retardation, are linked to environmental causes.
- Several common air pollutants, including particles and ozone, have been conclusively shown to trigger asthma attacks.⁷⁸

Children are highly vulnerable to environmental toxins, much more so than adults.

- Proportionally by weight, children are exposed to greater amounts of environmental toxins. On a pound per pound basis they eat more food, drink more water, and breathe more air than adults.
- Infants' and young children's exposures are magnified by living close to the ground and by frequently putting their hands in their mouths.
- Children are less able to rid their bodies of some environmental toxins than adults as they do not metabolize, detoxify, or excrete many toxins as effectively as adults.
- Children are more likely to develop diseases from environmental toxins than adults – their developing organ systems are more vulnerable to permanent damage, particularly when the exposures are *in utero*, and they have more future years of life for chronic diseases caused by environmental exposures to develop.

Current Policies

Inadequate funding for children's environmental health research: The National Children's Study

- The National Children's Study was mandated by Congress in 2000 to follow 100,000 children from before birth to age 21. By working with pregnant women and couples, the study will gather an unprecedented amount of data about how environmental factors alone, or interacting with genetic factors, affect childhood health. Examining a wide range of environmental

factors – from air, water, and dust to what children eat and how often they see a doctor – the study will help develop prevention strategies and cures for a wide range of childhood diseases.

- By collecting data nationwide – before diseases arise – the study can test unproven theories and generate results that will provide the foundation for children’s healthcare in the 21st Century. The Study can unlock solutions to America’s most serious childhood maladies, improving the lives of America’s children and reducing health costs for generations to come.
- Congress has already started the job. Between 2000 and 2005, Congress invested more than \$55 million to design the study and begin building the nationwide network necessary for its implementation. The tough job of designing and organizing is nearly complete. Funding for the Study this year will permit researchers to begin achieving the results that will make fundamental improvements in the health of America’s children.
- Unfortunately, the Administration has not provided continued funding in the fiscal year 2007 budget, which threatens to squander the investment already made and to throw away the multi-generational benefits the Study will yield.
- The Study will yield benefits far outweighing the cost. Today, six of the diseases that are the focus of the study (obesity, injury, asthma, diabetes, autism and schizophrenia) cost America \$642 billion each year. If the Study were to produce even a one percent reduction in the cost of these chronic diseases, it would save \$6.4 billion each year alone, 50 times more than the average yearly costs of the study itself.

Failing to reduce environmental pollutants that harm children

- The EPA has been unwilling to control some toxins in drinking water, such as the carcinogens arsenic and perchlorate, thereby exposing children to dangerous levels of these pollutants.^{79,80}
- Coal-burning power plants continue to emit high levels of mercury, which harms prenatal brain development, impairing intellectual and motor function.^{81,82}
- Clean air standards that regulate pollutants known to cause or worsen childhood respiratory diseases have been weakened.⁸³
- Despite the fact that 10 million children live within four miles of Superfund sites containing high levels of known toxic chemicals, the Administration has consistently under-funded the Superfund program. As a result, the average number of Superfund sites cleaned up per year has dropped from 87 in the late 90's to 40 under the current administration.⁸⁴

Failure to enforce the Food Quality Protection Act

- This act represented Congress's explicit attempt to set food safety standards that account for children's unique exposures and vulnerabilities to pesticides.
- For many of the most dangerous pesticides, the EPA has failed to incorporate an additional child safety factor in setting the amount of pesticides that may remain in foods.⁸⁵ In other cases, it has allowed some pesticide manufacturers to drag their feet in producing the health risk assessments necessary to protect children.

Recommended Proposals

Policies focused on child health and development would:

- Fully fund research that helps us understand how environmental pollutants affect the health of U.S. children, and how to prevent illnesses of environmental origin, particularly the National Children’s Study. Funding for the study this year requires a commitment of \$69 million,

which will be used to enroll children in the study and enable the NIH to continue establishing study sites around the country. The Study is an investment in our children – and in America's future.

- Enforce existing laws, such as the Food Quality Protection Act, the Clean Water Act, and the Clean Air Act, that protect our children from the harmful effects of toxic chemicals
- Make the health of our nation's children, rather than support from polluting industries, a top priority by reducing exposures to air pollutants, such as particles and ozone, and to toxic chemicals in our schools and our communities.

It is the intelligence and the creativity of today's children that will guide America through the 21st century. We must take action now to ensure that our children will grow up strong and healthy and that they develop to their full potential.

IX. WORKER SAFETY

- Linda Rosenstock

Overview: the Science and Human Health Impacts

Americans at work: longer hours, higher stress

- Americans are working longer hours, spending eight percent more time on the job than they did 20 years ago – 47 hours a week on average. 13 percent also work a second job.
- Americans lead the world in the number of hours worked each year [70 more on average than Japanese workers; 350 (about nine work weeks) more than Europeans].
- Increased working hours are a contributing factor to workplace stress – a growing problem in this country. An estimated 13 percent of U.S. worker compensation claims are for stress-related disorders. 27 percent of U.S. workers reported their jobs are the greatest single source of stress. Additionally, 46 percent of workers frequently worry about being laid off – job insecurity has more than doubled in the last twenty years.

Job safety: health and economic costs

- Each day, an average of 9,000 U.S. workers sustain disabling injuries on the job, 16 die from an injury suffered at work, and 137 die from work-related diseases.⁸⁶
- While rates of all workplace injuries and illnesses are declining, those for healthcare workers (eight percent of the U.S. workforce) are on the rise.⁸⁷ They face risks from lifting, stress, assaults, blood borne and respiratory infections, and latex allergy.
- As the population ages, the number of health care workers will likely increase, especially among lower-paid jobs such as home health aides.
- Recent data reveal that direct costs for occupational injuries in 1999 rose to \$40.1 billion, with indirect costs reaching over \$200 billion. The financial burden of workplace injuries is costing U.S. businesses nearly \$1 billion per week.⁸⁸
- Work-related musculoskeletal disorders (MSD), such as low back pain, tendonitis, and carpal tunnel syndrome, account for much of the cost of work-related illness in the U.S., amounting to an estimated \$13 to \$54 billion in treatment costs annually.
- For those MSD cases involving days away from work, approximately one third of some two million total cases were the result of overexertion or repetitive motion.⁸⁷

Lack of health insurance for working families

- The tragedy of no insurance and under-insurance is borne by workers and their families. More than 43 million Americans have no health insurance; more than 80 percent of them are in working families.⁸⁹
- Nearly 82 million people – one of every three younger than 65 – lacked health care coverage for all or part of 2002 and 2003. Fully 25 percent of middle-income families had no health care coverage during that period.⁹⁰ The burden falls disproportionately on younger workers, minority workers and those with less education.

Current Policies

Longer work hours and no health insurance set the stage for more work-related illness

- Since 2000, 2.9 million private-sector jobs have disappeared, including 2.8 million manufacturing jobs.⁹¹
- The federal regulatory process (which does not require congressional approval) has been used to make it easier for employers to avoid paying overtime, which would have meant “longer hours and less pay for millions of workers”⁹² according to the Economic Policy Institute. The Senate refused to support the President and approved guarantees for overtime pay for workers who stood to lose it under the new rules (co-sponsored by senators Harkin and Kerry).⁹³
- Since 2000, at least five million more people of working age (including 2.6 million in 2003 alone) have become uninsured. The increase from 2001 to 2002 was the largest in ten years. There is no plan to remedy this crisis.

Dismantling workplace safeguards

- OSHA has withdrawn its proposed rule to prevent exposure to tuberculosis, which also would have been effective in protecting workers from Severe Acute Respiratory Syndrome (SARS) and other airborne diseases.⁹⁴
- Due to the high rates of worker injuries and illnesses in nursing homes, OSHA initiated a special program of increased inspections and enforcement in this industry in 2002. OSHA did not renew the program even though injury and illness rates for nursing homes remain more than double the private sector national average.⁹⁴
- The Bush administration repealed the OSHA regulation to protect workers from back and other repetitive strain injuries. The rule, 10 years in the making, would have required employers to find and correct the conditions that cause more than one-third of all serious workplace injuries. After repealing the ergonomics rule, the Administration went a step further and eliminated OSHA’s requirement to document ergonomic injuries, making it even more difficult to track the severity of this problem.⁹⁴

Worker safety science

- The current administration is now implementing a reorganization plan that threatens to weaken and, at least in part, dismantle the National Institute for Occupational Safety and Health (NIOSH), the U.S.’s key worker health research and prevention agency. It has also halted work on dozens of worker protection measures, even refusing to require employers to pay for gloves and other personal protective equipment. This decision is especially important for immigrant and low-wage workers.

- The current administration has the worst record on safety rules in OSHA's entire history, with no plans to issue any new rules during his four-year term. Furthermore, the Administration has consistently proposed to cut the OSHA, Mine Safety and Health Administration (MSHA), and NIOSH budgets, reducing money for enforcement and setting standards in favor of voluntary assistance programs for employers.⁹⁴

Policy Recommendations

- Recognize that it is the working poor and working middleclass who disproportionately bear the burden of workplace illness and injury and are likely to not have health insurance. This is a national disgrace.
- Make working families a top priority.
- Restore funding to the agencies (OSHA, MSHA, and NIOSH) that can protect workers through research, regulation, and enforcement.
- Job creation and job security are critical factors both for workers' health and national economic security.

X. TRANSPORTATION

- Christine Pace

Overview: the Science and Human Health Impacts

Injuries and fatalities related to motor vehicles are a major public health problem.

- Car crashes claim more than 40,000 lives each year in the U.S. and are the leading cause of death among 1-24 year olds. With increasing use of cars comes increasing risk for crashes.⁹⁵
- Automobile-oriented, pedestrian-unfriendly roads and neighborhoods also contribute to the 78,000 injuries and almost 5,000 deaths suffered by pedestrians in this country each year.⁹⁶

Increasing car use means less physical activity.

- As Americans drive more, they walk and bicycle less. Sedentary Americans are at greater risk for cardiovascular disease, cancer, stroke, and other diseases than those who exercise.⁹⁵
- Furthermore, physical inactivity is associated with being overweight, so reliance on cars may be one of the reasons why two out of three Americans are overweight or obese.⁹⁵

Motor vehicles are a major contributor to air pollution and its substantial health impacts

- Cars and trucks account for about one third of nitrogen oxide and hydrocarbon emissions (which form ozone) and one fifth of air particle emissions in the U.S. – and much higher proportions in auto-choked metropolitan areas like Atlanta.^{95,97}
- These air pollutants are associated with significant respiratory problems. Such problems are particularly dangerous for the elderly, the very young, and those with illnesses such as asthma, a disease that is becoming increasingly prevalent among Americans.⁹⁵
- U.S. D.O.T. estimates the health effects of air pollution from motor vehicles cost us over \$40 billion yearly, a hidden tax of over \$600 a year on each household in the U.S.⁹⁸
- In addition, personal vehicles, including popular SUVs, currently produce almost 20 percent of total U.S. CO₂ emissions. Furthermore, they account for almost 60 percent of the increase in CO₂ emissions from the entire U.S. transportation sector from 1990-2001, and more than

20 percent of the increase from all U.S. sources during this period.⁹⁹ They are therefore major and growing contributors to global warming and to its significant threat to human health and livelihoods.⁹⁵

- In 2002, average fuel efficiency for all personal vehicles in the U.S., including vans, SUVs, and pickup trucks, hit its lowest level since 1980 - on average American vehicles consumed more gas and emitted more CO₂ per mile than they had in more than 20 years.¹⁰⁰

Noise pollution from roadways affects mental and physical well-being.

- In communities living near highways and other major thoroughfares, noise pollution can affect sleeping patterns and stress levels and even cause physical impairments.¹⁰¹
- With increasing reliance on cars and road expansion, noise pollution will become a worsening problem and require increasing expenditures on noise barriers.

Current Policy

- The current administration has limited enforcement of the Clean Air Act, allowing more pollution from new highways and sprawl, eliminating adopted air pollution controls in dozens of cities, and proposing legislation to reduce accounting for highway pollution.
- Executive Order #13274 has been used to end-run environmental laws and to prevent public involvement in approving transportation projects.¹⁰²
- The current administration has reduced the role of environmental agencies in reviewing transportation initiatives, leaving federal highway bureaucrats to adjudicate environmental concerns.
- The current administration cut funds for civil rights enforcement in the U.S. Department of Transportation and inadequately funded sidewalk and trail construction as well as public transit, making it harder for inner-city residents to get to their jobs.
- The current administration has emphasized road building over public transit, proposing an 80 percent federal match for road building, but only a 50 percent match for mass transit. It has also proposed to cut federal funds for air pollution reduction projects by seven percent in the fiscal year 2005 budget.
- The current administration has refused to increase fuel efficiency standards for cars and has only raised those for pickups, vans, and SUVs by a meager 1.5 mpg for 2007.¹⁰³

Recommended Proposals

Good policies would:

- Reverse the Bush administration's divisive transportation policies, which contributed to a failure to reauthorize the federal transportation bill in 2004, and seek bi-partisan support for legislation that funds local and state governments to make needed improvements to their transportation systems.
- Invest in public transportation and safer walking and bicycling infrastructure, while promoting smart highway management technologies and incentives to save travelers money and time.
- Follow more efficient "fix it first" principles – fixing the roads, bridges, and other transportation infrastructure we already have, and addressing existing bottlenecks and service gaps – before building more roads.
- Provide incentives and flexibility for states and businesses to experiment with more pay-as-you-drive transportation initiatives, such as cheaper car insurance for those who drive fewer

miles, payment for not driving to work, car-sharing programs to expand mobility for those without cars, and time-of-day managed express lanes to avoid congestion.

- Support the Safe Routes to School program to help America's children get out of cars and onto their feet and bikes, increasing their physical activity and relieving harried parents.
- Raise CAFE standards for all vehicles and close the SUV loophole that allows them to average 7mpg less than other passenger cars.
- Work with the auto industry to develop more fuel efficient vehicles now, using the best available technologies like hybrids, rather than shift attention, as the Bush administration has done, to developing far-in-the future fuel cell automobiles.
- Focus on fairness in transportation policy. America's increasing reliance on automobiles and failing public transit systems disenfranchise those who cannot afford cars or who cannot drive. Inadequate transportation isolates many Americans and limits access to resources and opportunities such as employment, medical care, and even supermarkets with nutritious food.
- Make increasing fuel efficiency standards for vehicles a top priority – to decrease our dependency on Mid-east oil and to diminish the threat of global warming.

Transportation produces huge benefits for Americans but also exacts an enormous toll on public health. As a nation, we must take the lead in developing safer, cleaner, more energy efficient vehicles and mass transit systems. These policies will reduce costs, preserve the environment, protect human health, and improve the quality of life in our communities.

XI. URBAN SPRAWL

- Christine Pace

Overview: the Science and Human Health Impacts

Urban sprawl is associated with more car travel and associated health risks than occurs in traditional cities and towns.

- Those who live and/or work in suburban areas rely heavily on cars and are thus highly exposed to their dangers.¹⁰⁴
- Roads in sprawling suburbs are also the most dangerous type for pedestrians, contributing to the 78,000 pedestrian injuries and almost 5,000 deaths in the U.S. each year.¹⁰⁵
- A greater reliance on automobiles rather than on biking or walking results in a more sedentary lifestyle, and thus promotes weight gain and its attendant health risks, including cardiovascular disease, stroke, and other diseases.^{104,106}
- The increased motor vehicle use associated with sprawl contributes to air pollution.

Urban sprawl threatens water quantity and quality.

- Suburban land absorbs less rain than forest and farmland because it is covered with relatively impermeable surfaces, such as concrete and asphalt. The resulting runoff cannot replenish groundwater supplies, damages streams and rivers during “storm surges,” and carries non-point source pollution such as oil into streams, lakes, rivers, wetlands, and groundwater.¹⁰⁴
- These declines in water quantity and quality can affect suburban dwellers as well as those who live in nearby urban or rural areas who share the same water supply.¹⁰⁴

Urban sprawl both benefits and threatens mental health.

- “Getting away” and having a bit of green space out the back door may be beneficial to one’s mental health.
- However, long commutes are linked not only to back pain and cardiovascular disease, but also to self-reported stress. This stress affects mental health generally, and may also contribute significantly to the problem of road rage in America.¹⁰⁴

Urban sprawl may contribute to in the weakening of family and community ties.

- Long commutes by car take Americans away from spending time with their families and interfere with their involvement in their communities.
- Suburban neighborhoods tend to be economically and ethnically homogeneous. In this way, these neighborhoods lose the diversity that can make more densely settled communities with their greater social stratification particularly dynamic and vital places to live.

Current Policy

- The current administration has left in place the EPA’s “Smart Growth” program and appointed two administrators who in the past had supported measures to curb sprawl. But it has also undermined efforts to establish consistent “smart growth” federal policies.
- The current administration has gutted the HOPE VI initiative that replaces large, dysfunctional urban housing projects with more livable, mixed-income communities.
- The current administration allocated less than 20 percent of the nation’s transportation spending to mass transit for 2004. The proposed TEA-21 reauthorization would continue to subsidize road-building and automobile use over alternatives. These policies perpetuate increasing car use and encourage further sprawl.

Recommended Proposals

Land use decisions are mostly local, but through transportation policy, tax policy, and regulatory incentives, the Federal government can support local initiatives that promote “smart growth” and protect the environment and human health. Sound policy would:

- Use the principles of “smart growth” to shape a coherent, consistent urban development policy across departments. “Smart growth” principles aim to create healthy, walkable, community-oriented neighborhoods *and* promote economic development. Integral to these goals are such practices as: mixed land use, compact building design, development of existing communities, and community collaboration.¹⁰⁷
- Support “fix it first” policies, directing funds to repairing existing water and sewer lines, bridges and tunnels, and other infrastructure, rather than exclusively building new infrastructure. This will maintain services in existing cities and towns and obviate some of the need for sprawl.
- Invest in our cities. A revitalized HUD will actively support the development of vacant properties, and the development of attractive, mixed-income, communities in cities and suburbs. HUD and EPA will actively support brownfield redevelopment. These measures will help restore vitality to cities, making them more desirable places to live, and reversing some of the incentives for sprawl.
- Invest in transportation. Reauthorization of TEA-21 presents legislators with the opportunity to make American transportation and land use healthier and better for our environment. Balanced transportation funding means greater emphasis on public transportation and non-

motorized travel (such as by sidewalks and multi-use trails) relative to highway construction. Public transportation is crucial to revitalize inner cities and provide alternatives to suburban flight, and it can also reduce the reliance of existing suburbs on cars.

- Consider the effects of transportation and land use policies on all communities, whether urban, rural or suburban, and whether they are wealthy or poor. A key emphasis will be the provision of housing that is near jobs and that is affordable to middle and working class families. Urban sprawl can isolate inner city communities from employment opportunities, healthcare services, healthy food options, and recreational opportunities for children. Newer development in cities and suburbs will offer expanded choices in housing and transportation access for families of all incomes. “Smart growth” and more comprehensive public transportation are important ways to ensure that all Americans can choose where they live and work.

Today, one in two Americans lives in the suburbs. Urban sprawl creates patterns of land use, transportation and social and economic development that may endanger the health of suburban dwellers as well as that of urban and rural communities.

XII. STRATOSPHERIC OZONE DEPLETION

- Eric Chivian, Mary Berlik and David Doniger

Overview: the Science and Human Health Impacts

Current science concerning the ozone layer

- Increases in the concentrations of chlorine and bromine in the stratosphere from human-made compounds such as chlorofluorocarbons (CFC's), halons, and the pesticide methyl bromide have been responsible for thinning of the stratospheric ozone layer.¹⁰⁸
- This thinning results in increased levels of ultraviolet B radiation (UVB) reaching the Earth's surface. Increased UVB exposure is known to be harmful to all living things.¹⁰⁸
- Global warming, a consequence of human activity, may delay recovery of the stratospheric ozone layer. This recovery has been set in motion by the phasing out of ozone-depleting chemicals under the Montreal Protocol. Greenhouse gas emissions, while warming the lower atmosphere and the Earth's surface, result in a cooling of the stratosphere, which, it is predicted, may speed up the rate of ozone destruction.¹⁰⁸

Human health impacts of ozone depletion

- Exposure to raised levels of UVB can cause a number of harmful human health impacts, including the formation of cataracts, the second leading cause of blindness worldwide; severe skin burns; and skin cancers —basal cell carcinomas, squamous cell carcinomas, and cutaneous melanomas.¹⁰⁹
- Basal cell and squamous cell carcinomas generally spread locally and tend not to metastasize. They are rarely fatal, but can cause significant disfigurement and cost the U.S. economy as much as \$700 million annually.¹¹⁰
- Cutaneous melanomas generally do metastasize to bone, liver, and other organs, and are usually fatal if not removed early in their course. Almost 8,000 people die each year in the

- U.S. from cutaneous melanomas,¹¹¹ which cost the U.S. economy a total of \$563 million in 1997.¹¹²
- UVB can also suppress the human immune system. This immune suppression may result in greater difficulty for patients with herpes viruses and HIV to control their infections, reduced effectiveness for some vaccines, worsening of some autoimmune diseases such as systemic lupus erythematosus, and greater susceptibility to some cancers such as non-Hodgkins lymphomas.¹⁰⁹
- UVB is also harmful to animals, including domestic livestock and farmed fish. For example, UVB has been shown to increase the cancer incidence and severity of some infectious eye diseases in cattle, and to cause cataracts and skin lesions in farmed fish.¹¹³ UVB can also affect wildlife such as amphibians, some land plants, and some marine organisms such as phytoplankton, shrimp, and crabs,¹¹⁴ and is expected to reduce the productivity of certain crops and the availability of some commercial fish.¹¹⁵

Current Policies

- The Montreal Protocol, negotiated under President Reagan and supported by the first President Bush and by President Clinton, is designed to stop depletion of the ozone layer. If faithfully carried out, the Protocol promises recovery of the ozone layer over the next 50 years or so. The Protocol is the most effective global environmental treaty ever put in place and is a prime example of what we can accomplish through multilateral cooperation. But actions by the Bush administration threaten to weaken the treaty and prolong the period under which we suffer from ozone depletion.
- Under the Protocol, the industrial world has almost completely eliminated CFCs, halons, and most other potent ozone-depleting chemicals. Methyl bromide is the most powerful ozone-depleting chemical still in widespread use. Methyl bromide production has already been reduced by 70 percent, but the current administration has pressed for exemptions to *increase* methyl bromide production, even though effective, ozone-friendly alternatives exist for most uses.¹¹⁶ This policy has been driven by political rather than by human health or environmental considerations.
- In addition, the current administration has proposed new rules requiring methyl bromide treatment of all imported and exported raw wood packaging materials, a change that could triple worldwide use of methyl bromide. Offered in the name of protecting our forests from non-native insects, the proposal ignores the U.S. Department of Agriculture's finding that safer, more effective alternatives exist for stopping the insects without harming the ozone layer: to move from raw wood packaging to other materials, or to apply kiln treatments to wood packaging. The USDA has broken a promise made in 2000 to consider alternative packaging.¹¹⁷
- Methyl bromide also poses direct health risks to agricultural workers. Research led by the National Cancer Institute has found that agricultural workers exposed to methyl bromide are at a significantly higher risk of developing prostate cancer than workers who were not exposed.¹¹⁸
- The current administration has rejected the Kyoto Protocol, but has developed no effective alternatives for reducing greenhouse gas emissions, thereby endangering the progress of ozone layer recovery.

Recommended Proposals

Good policies would:

- Honor our country's commitment to safeguard the health of all people by protecting the Earth's fragile ozone layer and will complete the phase-out of ozone-depleting chemicals, including methyl bromide.
- Make a major commitment to reducing greenhouse gas emissions, not only to prevent the potentially catastrophic environmental and human health consequences of global warming, but also because greenhouse gases are likely to worsen stratospheric ozone depletion.

XIII. GLOBAL POPULATION GROWTH

- Robert Engelman

Overview: the Science and Human Health Impacts

The rate of world population growth is slowing significantly but unevenly, with the vast majority of growth now occurring in developing countries.

- World population is approaching 6.4 billion, having doubled since John F. Kennedy was president. The world gains 75 million people each year, 200,000 each day.¹¹⁹
- Nonetheless the rate of population growth is slowing down. Worldwide, women on average now have fewer than three children, a revolutionary shift from the 1960's average of five children. Most women in the world – in fact most women in developing countries – rely on modern contraception to avoid unintended pregnancies.¹¹⁹
- About 85 million unintended pregnancies occur worldwide each year. Nearly 40 percent of the total, (about 46 million) end in abortion. These figures speak to the high level of unmet need for safe and effective contraception.
- Moreover, current population growth is highly uneven. Some of the world's poorest and most poorly governed nations are growing the most rapidly, while many industrialized nations are heading towards population decline. By contrast, the U.S. population continues to grow at more than 1 percent each year, with no imminent prospects for a stable or declining population.¹¹⁹

Population growth leads to a variety of local and global environmental impacts and health problems. These include:

- freshwater scarcity, now pervasive in dozens of African and Asian countries;¹²⁰
- human-induced climate change, as population growth brings about greater energy consumption and associated greenhouse-gas emissions;¹²¹
- food insecurity, as water and cropland scarcity spread; and
- loss of the Earth's biological diversity, as expansion of farms and housing reduces habitat and brings more species to the brink of extinction.¹²²

Scientists generally agree that population growth, interacting with growing consumption and changing technologies, boosts the impact of human activities on Nature to levels where key but unforeseen natural thresholds may be crossed.

- “Rapid population growth has exacerbated freshwater depletion, climate change, biodiversity loss, depletion of fisheries and other coastal resources, and degradation of agricultural lands,”

a distinguished international panel of scientists reported to the World Summit on Sustainable Development in 2002. Fertility decline, the statement added, “can make many environmental problems easier to solve.”¹²³

- Population growth is a factor in the recent upsurge of emerging infectious diseases, by spurring deforestation, increasing contact between people and animals, and bringing about a constant intermixing of species through globalization and global trade.
- Most of the world’s fisheries have been severely depleted or are in sharp decline from decades of over-exploitation. Aquaculture is filling some of the gap, but faces its own economic and environmental limits in feeding a growing world population.
- The population of people living in water-scarce countries is growing much more rapidly than world population itself, thereby limiting needed expansions of irrigated agriculture and threatening human health.
- As water supplies shrink and as water quality deteriorates, at least 1.7 million deaths occur annually, mostly among children, due to contaminated drinking water.
- Population growth has offset the progress made from water infrastructure development; the number of people without access to safe water and sanitation has not changed in decades.

Current Policy

Overall hostility to population and reproductive health programs worldwide has:

- The Mexico City Policy, also called the “Global Gag Rule” was reinstated in 2001. This rule bans the U.S. from providing assistance to any foreign non-governmental organization that refuses to pledge that they will not provide abortion services or counseling, or refer clients to others who do so, even if these organizations are in countries where abortion is legal.¹²⁴
- Resulted in decreased family planning assistance (which actually would reduce abortion prevalence), despite growing proportions of women and men in developing countries who want to prevent or postpone pregnancies.¹²⁵
- Disassociated the United States from a 2002 landmark international accord, which all of the other 28 participating countries supported without reservations, that works to achieve a sustainable human population through improving the health, education and well-being of women worldwide. Moreover, the administration has lobbied unsuccessfully to convince other nations to do likewise, eroding the standing of the U.S. on women’s health and related gender issues with these nations.¹²⁶
- Denied long-established and essential funding to the United Nations Population Fund, claiming that they are promoting coercive abortions in China. Yet, the State Department, at the administration’s request, investigated UNFPA activities in China and found that they had not engaged in these practices.¹²⁷ And, the current administration has threatened to cut off funding from UNICEF and the World Health Organization if they work with the UNFPA in an attempt to further isolate that U.N. agency.¹²⁷

Recommended Proposals

Sound policy would:

- Call for annual increases in spending on international family planning assistance commensurate with our GDP that would put the United States on a path toward contributing to universal access to family planning and related health care services.

- Rejoin the international community in affirming that the appropriate ways to address unsustainable world population growth are to support universal access to reproductive health services, and to champion the education, and the economic, social and political empowerment of women.
- Revoke the “Global Gag Rule” by executive order.

Despite emerging concerns in some industrialized countries that population aging and decline threaten economic prosperity, world population is still growing rapidly and presents major global risks: environmental degradation, persistent poverty, severe human health impacts, and greater potential for conflict. The United States has in the past been a leading partner with other industrialized “donor” countries in addressing population issues by working to improve the health and lives of the world’s poorest women. It is in the interest of the U.S. to again assume a leadership role in helping to stabilize world population growth.

XIV. Nuclear Energy

- Richard Clapp

Overview: the Science and Human Health Impacts

The current state of the nuclear power industry in the U.S.

- The Three Mile Island and Chernobyl nuclear accidents, along with falling oil prices, led to a sharp decrease in U.S. demand for nuclear energy in the 1980’s. No new nuclear reactors have been ordered in the U.S. since 1978.
- Concern about the health and environmental effects of burning fossil fuels such as coal and oil has resulted in a recent resurgence of interest in nuclear power as a “carbon-free” method of generating electricity.
- There are currently 104 fully-licensed nuclear power plants in the U.S., of which 103 are in operation. Together they produce approximately 20 percent of the U.S.’s electricity.
- Every nuclear power plant in the U.S. is registered with and licensed and monitored by the Nuclear Regulatory Commission (NRC), an independent government agency.
- Many of these plants (most of which were built in the 1970s) are currently applying to the NRC to extend their operation licenses for an additional 20 to 40 years.
- Reprocessing of nuclear fuel is a controversial topic: While it recycles portions of spent fuel into usable uranium and plutonium to be burned as fuel in power production, it also results in a larger total amount of waste, is very costly and isolates plutonium which could be used in weapons manufacture. President Carter banned commercial reprocessing in the U.S. in 1977 for non-proliferation reasons, but President Bush has recently included reprocessing as a part of his Global Nuclear Energy Partnership plan released in February 2006.
- While the capacity and efficiency of nuclear power plants has improved significantly over the years in both old and new designs, several significant obstacles have yet to be overcome.
- Safe and permanent storage of high level nuclear waste (which can remain dangerous for tens of thousands of years) is unresolved. Currently, high level waste is stored on site at nuclear power plants awaiting final disposal.

- Preventing the use of nuclear materials for the production of nuclear weapons or “dirty bombs” is an on-going concern.
- Mitigating the risk of large-scale nuclear accidents requires costly security and training procedures over many years.

There are negative human health effects involved with each stage of the nuclear fuel cycle

- Uranium mining and milling account for the largest human health burden, including respiratory exposures to dust, heavy metals and radon gas.
- Conversion & enrichment involve radiation exposure risks at each stage
- Power plant operation involves consistent low-level radiation exposure risk, which has been linked to increased cancer morbidity and mortality, as well as risk of accidents or spills.
- Fuel reprocessing takes place in separate facilities, some of which have been known to cause environmental and health damage due to radioactive releases.
- Plant decommissioning and transportation of parts and spent fuel involves potential exposures and risk of accidents for the workers or for communities along transportation routes.

Current Policy

The present administration has included increased funding and support for nuclear power as a cornerstone of its energy policy package.

- The **Nuclear Waste Policy Act of 1982** initiated the search for a deep geological repository and declared that the federal government would begin accepting high level nuclear waste from industrial providers for disposal in 1998. With no such repository in operation, the government remains in non-compliance with the Act and has been subject to lawsuits from the nuclear industry as a result.
- Yucca Mountain, NV was declared as the only potential site to be investigated as a deep geological repository for high level waste and has been subject to two decades of extensive research regarding its suitability. Both Congress and the President have deemed it a suitable site, but the state of Nevada and several independent stakeholders disagree
- The non-military nuclear industry is currently protected under the **Price-Anderson Nuclear Industries Indemnity Act**, renewed for 20 years in 2005, which insures the industry for any liabilities in excess of \$10 billion. This Act covers the industry in the case of a nuclear incident that would cost far more than traditional insurance companies would insure the companies for.

Recommended Proposals

Every stage of the nuclear fuel cycle involves risks to human health and the environment, in addition to the unresolved issues of waste storage and weapons proliferation. There are other carbon-free options that do not carry such high risk or high cost and these should be promoted.

- Hold off on license extensions for existing plants that cannot meet safety guidelines.
- Resist proposals to permit any new nuclear power plants until a workable solution to the high-level waste storage problem is found.
- Ramp up support for renewable energy technologies now, following the “Apollo Alliance” (www.apolloalliance.org) model.

XV. SUSTAINABLE ENERGY

- Ross Gelbspan

The challenge of global warming is defined by one fact: climate stabilization requires humanity - worldwide -- to reduce its burning of coal and oil by 70 percent. The pacification of our inflamed atmosphere requires a rapid global switch to non-carbon energy sources -- wind, solar, tidal power, hydrogen fuel, etc. Unfortunately, lifestyle changes cannot accomplish this kind of transition. Even if we all sat in the dark and rode bicycles, it would not stop global warming. Nor can it be accomplished by countries acting individually. Unilateral national efforts risk jeopardizing the competitiveness of national economies and penalizing the most environmentally conscientious societies.

A global clean energy transition would have enormously beneficial economic outcomes. Economists tell us that every dollar invested in energy in poor countries creates far more wealth and jobs than the same dollar invested in any other economic sector. A wholesale transfer of clean energy to developing countries would create millions of jobs. It would generate a burst of new businesses and indigenous industries. It would begin to turn impoverished and dependent countries into robust trading partners. Ultimately it would dramatically expand the overall wealth of the global economy.

The climate challenge requires all the countries of the world to adopt a common framework with mandatory reduction targets to bring all the countries of the world together in a common global project. Within such a framework countries can find their own optimal ways to meet that goal. One possible framework involves a package of three integrated, self-reinforcing policy measures (CET) that could propel a rapid global transition to clean energy.

CLEAN ENERGY TRANSITION:

The elements of the international program known as CET include:

- A change in energy subsidy policies in industrial countries.
- The creation of a large fund to transfer renewable energy technologies to developing countries.
- The establishment within the Kyoto framework of a binding, progressive Fossil Fuel Efficiency Standard that rises by five percent per year until the global goal of 70 percent reductions is achieved.

1) Subsidy switch in industrial countries: the United States currently spends more than \$25 billion a year to subsidize fossil fuels. Industrial country subsidies for fossil fuels have been estimated at \$200 billion a year. In the industrial countries, those subsidies should be withdrawn from fossil fuels and equivalent subsidies be established to promote the development and deployment of clean energy sources such as wind, solar, tidal power, small-scale hydro-electric production, biofuels and an infrastructure for a hydrogen economy. The re-direction of the subsidies also would trigger the emergency of an army of energy engineers and entrepreneurs with successively more efficient generations of solar film, turbines, tidal devices, etc., in an explosion of creativity that would rival the dot.com revolution of the 1990s.

2) Clean Energy Fund for Developing Countries: Even if the countries of the North were dramatically to reduce emissions, those cuts would be overwhelmed by the coming pulse of carbon from India, China, Mexico and Nigeria. The transition therefore requires a fund of about \$300 billion a year for about a decade to jump-start renewable energy infrastructures in developing countries. All developing countries would love to switch to clean energy. The most air-polluted cities in the world are in China, India, Thailand, Mexico and other developing countries. Unfortunately, those countries simply cannot afford to finance a clean energy transition. One source of revenue to fund this initiative is a "Tobin tax" on international currency transactions, named after its developer, Nobel prize-winning economist Dr. James Tobin. Today the commerce in currency swaps by banks and speculators is approaching \$2 trillion per day. A tax of a quarter-penny on a dollar would net out to about \$300 billion a year for wind farms in India, fuel-cell factories in South Africa, solar assemblies in El Salvador, and vast, solar-powered hydrogen farms in the Middle East.

3) Progressive Fossil Fuel Efficiency Standard: The third and unifying strategy calls on the parties to Kyoto to adopt a binding, progressively more stringent Fossil Fuel Efficiency Standard. Under this mechanism, every country would start at its current baseline to increase its Fossil Fuel energy efficiency by five percent every year until the global 70 percent reduction is attained. That means a country would produce the same amount of goods as the previous year with five percent less carbon fuel. Alternatively, it would produce five percent more goods with the same carbon fuel use as the previous year. Since no economy can grow at five percent for long, emissions reductions would outpace long-term economic growth.

For the first few years of the efficiency standard, most countries would meet their goals by implementing low-cost or even profitable efficiencies in their current energy systems. After a few years, as those efficiencies became more expensive, countries would meet the progressively more stringent standard by drawing more and more energy from non-carbon sources – most of which are 100 percent efficient by a Fossil Fuel Efficiency Standard. That, in turn, would create the mass markets and economies of scale for renewables that would bring down their prices and make them competitive with coal and oil.

The fact that every country would begin at its current baseline would eliminate the equity controversies inherent in the "cap-and-trade" system – and would, in tandem with the Fund – assure the participation of developing countries. This approach would be far simpler to negotiate than the current Protocol, with its morass of details involving emissions trading, reviews of the adequacy of commitments and differentiated targets. It would also be far easier to monitor and enforce. A nation's compliance would be measured simply by calculating the annual change in the ratio of its carbon fuel use to its gross domestic product. That ratio would have to change by five percent a year.

The CET, then, would be driven by three engines: the subsidy switch would propel the metamorphosis of oil companies into energy companies; the progressive fossil fuel efficiency standard would harmonize the transformation of national energy structures, create a level field of predictable regulation for the major energy corporations, and jump renewable energy into a global industry; the competition for the new \$300 billion a year market in clean energy would power the whole process.

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