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THE TIME TO ACT: ENVIRONMENTAL OPPORTUNITIES  
IN AN ECONOMIC DOWNTURN

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## **ABSTRACT**

An economic downturn creates a unique set of circumstances where it may be advantageous to restructure current industries and processes that are damaging the environment. When faced with such large economic and environmental problems, the incentive to make changes is present and not to be wasted. By evaluating the changing economy and highlighting ways industry can increase viability by decreasing environmental impacts, opportunities for environmental betterment born out of the current economic crisis can be determined. Alternatives are available to industries that help to restore both the economy and the environment, such as increasing resource productivity and energy efficiency. The numerous economic, environmental, and political benefits generated by increased resource productivity and energy efficiency make these mechanisms a powerful solution to the world's economic and environmental woes. Many are working towards separate economic or environmental solutions, but the benefits of linking the two are numerous, including emerging from economic crisis better than before with decreased unemployment and a sustainable future.

## TABLE OF CONTENTS

Chapter 1. INTRODUCTION.....	1
Global Environmental Crisis.....	1
Global Economic Crisis.....	3
Mutual Solutions.....	5
Chapter 2. DIFFERENT APPROACHES & NEW OPPORTUNITIES.....	7
We Can Do Better: A Win-Lose Situation.....	7
Win-Win Situations.....	9
Resource Productivity.....	11
Energy Efficiency.....	15
Chapter 3. CONCLUSION.....	21
Additional Benefits.....	21
Obstacles.....	24
The Time to Act.....	26
Works Cited.....	29

## Chapter 1

# Introduction

The path of history has brought the human race to a juncture of environmental and economic crisis. Earth's resources of land, minerals, forests, air, and water fuel the machine of economic growth. Problems with this system are arising, however, with the declining availability of inputs and the increasing onslaught of outputs. As this unsustainable system of resource use and waste begins to cause major global environmental issues, the world economy has also taken a severe blow.

Historically, the price of resources would be lowered, increasing the amount of products manufactured, lowering prices and stimulating consumers to purchase more. Wealth would be generated, but at the continued expense of the environment and the sacrifice of sustainability. Inextricably linked, the environment and the economy have the capacity to deteriorate human society or sustain it far into the future. After examining the current state of the environment and economy, solutions can be weighed: keep doing business as usual or introduce new ways of thinking and acting.

### ***Global Environmental Crisis***

The world is currently facing a demoralizing list of environmental problems, a list that grows in number and complexity with each passing year. The endless pursuit of earth's resources for the survival and development of human society has impacted every

ecosystem on the planet. Impacts have historically been direct: deforestation, mining, pesticide use, oil spills, road and building construction, emissions from cars and industries causing water, land, and air pollution. The awareness that these impacts have been progressing and accumulating to cause more widespread, indirect problems has been growing for decades. Acid rain caused by urban air pollution degrades remote forests. High rates of water consumption draw down groundwater supplies across entire regions. Foremost in concern when considering widespread environmental issues, however, is global warming.

Increased carbon dioxide in the atmosphere blocks the radiation of heat into space, trapping it between the earth's surface and atmosphere. Warmer air holds more water vapor; increased water vapor in air leads to increased precipitation. The pattern of air and ocean currents is impacted by increased temperature and faster cycling rates of air and water. Warmer oceans can increase the frequency and severity of tropical and inland storms and melt sea ice, ice caps and glaciers, raising sea levels and flooding coastlines. When combined with changes in precipitation, increased soil temperatures shift the type and amount of vegetation on land, which affects animal and human populations. Effects of climate change can be traced through every link in the wide, complex network of ecosystem interactions (Hawken, Lovins, and Lovins 236-38). Indiscriminate of the source or location of carbon dioxide emissions, global warming has the potential to shift the climate of the entire world.

Thus the environmental problems facing the world today have reached an unprecedented level of extent and complexity. John Bellamy Foster provides a sobering

list of urgent environmental issues in his book *The Vulnerable Planet*:

[O]verpopulation, destruction of the ozone layer, global warming, extinction of species, loss of genetic diversity, acid rain, nuclear contamination, tropical deforestation, the elimination of climax forests, wetland destruction, soil erosion, desertification, floods, famine, the despoliation of lakes, streams, and rivers, the drawing down and contamination of ground water, the pollution of coastal waters and estuaries, the destruction of coral reefs, oil spills, overfishing, expanding landfills, toxic wastes, the poisonous effects of insecticides and herbicides, exposure to hazards on the job, urban congestion, and the depletion of nonrenewable resources... (11)

The number of problems on this list is daunting; the reality that it is far from comprehensive is dispiriting. Then in 2008, in the midst of all these problems, the bottom fell out of the global economy, further complicating the work of innumerable individuals, organizations, agencies, and governments to find and implement solutions to environmental problems.

### ***Global Economic Crisis***

Environmental interests have long been thought to have a negative impact on business and economic growth. Environmental protection usually takes the form of limiting what resources can be used, how many can be harvested, how they are used, and where and how they will be disposed. These restrictions are obstacles, often costly ones,

that businesses must overcome in order to be competitive and successful (Goldstein 217-20). The global economic downturn in 2008 added an extra layer of difficulty and complexity to the interplay between environmental protection and economic viability.

For the United States, the subprime lending crisis in 2007 marked the beginning of the slide into recession. Lenders were approving mortgages with limited investigation into or consideration of the borrower's ability to make payments. As more and more borrowers defaulted on loan payments, investors started pulling money out of lending companies with large amounts of risky debt, leading to the failure of many subprime lenders (Schwartz and Bajaj). Stricter credit conditions and concerns about losses from bad investments led to mild economic recession in mid-2008, but things fell apart quickly after the fall of the large investment bank Lehman Brothers and government bailout of American International Group (AIG), America's largest insurance company. The meltdown of these large companies called into question the ability of financial institutions to repay debts and meet other agreements (International Monetary Fund 2).

With the excesses and consequent failures occurring at the core of the banking system, negative effects have been felt in every sector and country in the global economy. Measures to correct past excesses in the now volatile market have had adverse effects on the flow of capital and investment. National economies that relied on foreign investment for growth are stagnant; even highly rated private investors are feeling the credit crunch. Business and consumer confidence has collapsed, household wealth has declined, and unemployment continues to grow. Government policy responses have been rapid and wide-ranging, but have yet to completely halt downward spiraling and correct all issues,

particularly unemployment. Countries with advanced economies, such as Japan, Great Britain, Germany, and the United States, have introduced large stimulus packages to avoid the failure of more major financial institutions. In the U.S., economic stimulus legislation seems to have prevented further degradation, but its effectiveness for complete recovery is still tenuous (International Monetary Fund 3-7).

With unemployment reaching 10.2 percent in November 2009 and the national deficit in excess of \$11 trillion, something much larger than a government-sponsored stimulus package needs be done to ensure long-term economic stability and prosperity (Fletcher and Irwin; Raum and Taylor). As in the past, future economic stability and growth relies on the environment. Continued or enhanced misuse and overextension of natural resources at this time would seriously undermine economic longevity, therefore environmental issues must be coupled with economic issues. With proper consideration and action, economic recovery and growth can be driven by environmental betterment to ensure a secure, stable, prosperous future.

### ***Mutual Solutions***

Current systems of production have failed the environment. Resources are bought and used without consideration for their true ecological value. The value of a forest's ability to filter water and sequester carbon is lost in the insatiable race to produce and earn more and more in order to advance in today's society (*Real People*). This system has endangered the very resources that sustain it. Inefficient and excessive consumption has decreased resource stocks while overwhelming capacity to safely dispose waste and

mitigate negative effects (Foster 122). By making systems of production more efficient, less energy and resources are needed to make the products consumers demand and less waste is generated. To industries and producers, this translates into less money spent and wasted; money that can be better used to hire and pay employees, who in turn buy more and drive overall economic prosperity.

An economic downturn creates a unique set of circumstances where it may be advantageous to rethink and rebuild current processes and industries that are damaging the environment. When faced with such large economic and environmental problems, the incentive and rationale to make changes is present and not to be wasted. By highlighting ways industry can increase economic viability by decreasing environmental impacts, opportunities for environmental betterment born out of the current economic crisis can be determined. Alternatives are available to industries that help to restore both the economy and the environment, such as increasing resource productivity and energy efficiency. The numerous economic, environmental, and political benefits generated by increased resource productivity and energy efficiency make these mechanisms a powerful solution to the world's economic and environmental woes. Many are working towards separate economic or environmental solutions, but the benefits of linking the two are numerous, including emerging from economic crisis better than before with decreased unemployment and a sustainable future.

## Chapter 2

### **Different Approaches & New Opportunities**

The current economic downturn has aided the environment in two different ways. First, household income has been impacted, therefore consumers are more inclined to waste less and buy fewer products. Demand for products is reduced, driving industries to produce less, which lowers resource consumption and harmful emissions (Lamb). While good for the environment, this production and consumption depression is bad for the economy and has no real permanence. The second environmental benefit of the economic downturn, however, has the lasting ability to sustain both economy and environment. By investing in resource productivity and energy efficiency, wealth and jobs can be generated in these difficult economic times (Hawken, Lovins, and Lovins 307). In this way, economic and business incentives are driven by environmental betterment, creating a win-win situation for the world.

#### ***We Can Do Better: A Win-Lose Situation***

In October of 2009, the Energy Information Administration reported a 5.9 percent drop in carbon dioxide emissions from U.S. coal, oil, and natural gas use. Usage fell from 5.97 billion tons in 2005 to 5.45 billion tons in 2009 due to the troubled economy and resulting industrial changes (Lomax). While putting reduced carbon emissions goals closer at hand, this is hardly a cause for celebration by environmentalists or economists.

Lowered consumption and production due to the economic downturn has spurred many short-term environmental benefits that do little to improve the economy and create a lasting, sustainable solution.

Many households are struggling with the ill effects of the weak economy. The hardest hit are the unemployed or laid off, while those that have jobs live under the threat of losing that job at any time. College graduates that have spent thousands of dollars on their education are entering a scarce and highly competitive job market. With limited prospects and security, people are paying a lot more attention to their expenditures. High fuel and maintenance expenses are pushing people to drive less and use public transportation more. Consumers are reducing the number of new products they are buying and are more inclined to reuse what they already have. Fewer shoppers means fewer goods demanded, which reduces manufacturing and other industry. Reduced production means less pressure to harvest or extract natural resources as industrial inputs, while reducing harmful outputs like emissions, pollution, and waste (Kostigen).

Even though these reductions provide some benefit to the environment, they are highly linked to circumstance and are therefore subject to change. The economy is bound to improve some time by some means. Consumption and production would continue as before, with no lasting changes made to simultaneously drive environmental and economic sustainability. Society would be put back on the same path of consumption and waste that leads to resource scarcity, pollution, and climate change, endangering future national security and economic stability in the same ways it does at present. As proposed earlier, solutions can follow two paths: keep doing business as usual or

introduce new ways of thinking and acting.

Relying on the short-term benefits of the economic downturn would be business as usual with either the economy or the environment emerging as the winner. For many years now, the economy has won while the environment has lost. The current economic crisis, however, has temporarily turned the tables. Settling for this situation, however, is unacceptable because a win-win situation is achievable. There are different ways to look at current industrial processes that improve both economy and environment. Inputs can be reduced by increasing resource productivity and energy efficiency instead of relying on economic depression or reaching a crippling level of resource scarcity. Furthermore, pollution and waste can be decreased by increasing efficiency and creating new ways to reuse waste (Hawken, Lovins, and Lovins 10-1). Companies employing these techniques require fewer inputs, therefore spend less outright while saving money on environmental compliance, fines and waste disposal. The environmental and economic benefits of these win-win situations will be further explored in the next section.

### ***Win-Win Situations***

The tragedy of current industrial systems is waste. This waste takes all forms; material, energy, money, and humans are all wasted to a staggering degree. Not including wastewater, the total wastes produced in the U.S. exceed 50 trillion pounds per year. Factoring in wastewater, that amount is raised to 250 trillion pounds annually. At this rate, approximately 500 trillion pounds of American resources will be converted into nonproductive solids and gases in the next ten years (Hawken, Lovins, and Lovins 52-3).

The amount of energy needed to operate these wasteful processes accounts for an estimated 6 to 10 percent of the U.S. economy, exceeding \$200 billion annually (Goldstein 5).

By not using material and energy resources to their maximum productivity potential, companies are simply wasting money. Money is spent buying more material and energy to manufacture products, instead of investing in technology to produce more goods from fewer resources. Wasting money in one area means it cannot be spent on other things, like hiring more employees, increasing wages and benefits, and investing in research and development to further streamline production and increase product quality. Despite efforts to reinvigorate the weak economy, 10.2 percent of Americans remain unemployed and industries continue to waste money on 250 trillion tons of resources (Fletcher and Irwin; Goldstein 85).

Investing in technology to increase resource productivity and energy efficiency can reverse the coupled downward spiral of resource waste and economic instability. The World Resources Institute found that every \$1 billion invested in green components of the recovery effort would generate an average of 30,000 jobs and approximately \$450 million in energy savings for the American people (Heilmayr). Combined with what the U.S. government is willing to spend on economic recovery, such as the \$787 billion put forth in the American Recovery and Reinvestment Act of 2009, the potential job creation, energy savings, and environmental improvement figures from green recovery projects are staggering. Factor in the potential private investment by companies and the path to economic and environmental betterment begins to get clearer.

The main challenge is to demonstrate to industries how business practices that improve the environment can actually increase wealth, create jobs, and drive technological innovation, which opposes traditional business thinking. Environmental considerations have historically been thought of as harmful and hindering to industry by restricting options and increasing costs (Goldstein xxix). As explained in the following sections, however, increased resource productivity and energy efficiency reduce costs and encourage innovation, creating a new system of production that has the potential to continue far into the future.

### ***Resource Productivity***

Increasing resource productivity can be technically complex in practice, but the theory behind it is very straightforward: use less to make more. Scientists and engineers have developed and continue to develop ways to derive the same amount of utility or more from a resource or process while using less energy and material. Resources like minerals, timber, fossil fuels, and water are being used five to one hundred times more efficiently than in the past. This is accomplished by reexamining entire production processes, starting with design (Hawken, Lovins, and Lovins 10-4).

Instead of removing excess material to achieve a finished product, manufacturing processes have been altered to ensure that all material put into a process emerges as the finished product. One example is casting metal parts in molds instead of machining a rough shape down to the desired product. Materials are also being saved by consolidating many small separate pieces into one large molded part, such as reducing a steel tricycle

with 126 parts to a cheaper, plastic version with only 26 parts. Computer programs and devices have been designed to compute the most cost-effective way to saw a log into lumber with the least sawdust and to cut clothing fabric into complex designs that reduces the amount of scrap cloth (Hawken, Lovins, and Lovins 74-6).

Eliminating waste like sawdust and cloth scraps draws the innovative eye to the opposite end of the production cycle. Waste can often be completely avoided by redesigning manufacturing processes, but can also be reabsorbed or reused if it is generated. Scrap recovery can be implemented to reclaim material for production, like collecting scrap metals to be reused in manufacturing. Sawdust, wood chips, and paper waste generated by lumber mills, furniture makers, and other industries can be sold to gardening centers, landscapers, and farmers as mulch or livestock bedding. Farmers can sell manure to fertilizer manufacturers or capture released methane to generate electricity. Whether manufacturing jet engine turbine blades, sawing lumber, and raising beef cattle, businesses spend most of their money on the resources needed for production, therefore it is a smart decision to get the most out of those resources by using them entirely or making a profit from the waste and byproducts (Hawken, Lovins, and Lovins 74-80).

The production of aluminum beverage cans is a classic example of a complex, resource-intensive process that culminates in a few brief moments of consumption before being discarded. A brief overview of an aluminum can's history is as follows: one ton of mined bauxite is chemically purified into a half ton of aluminum oxide. This ore is then shipped across oceans to smelters, which, through an energy-intensive process, convert each half ton of aluminum oxide into a quarter ton of aluminum metal. The aluminum

metal is then shipped to roller mills, where it is heated and rolled to a thickness of one-eighth inch. These coils are then transported and stored before being, once again, transported for cold rolling to become ten times thinner in order to be ready for production. The aluminum sheets are cut, folded, and painted several times with base paint, product information, lacquer, and an anti-corrosive inner coating. Empty cans are then packaged and stored until being transported to bottling facilities, where they receive their precious cargo and are once more packaged, stored, and distributed (Hawken, Lovins, and Lovins 49-50).

Consider the amount of metal, mineral ore, fossil fuels, plastic, cardboard, paints, inks, chemicals, and water that are required in the process to produce a single aluminum can. Its life cycle mirrors that of so many other products that are only useful for a few moments. Fortunately, improvements to its production life cycle are also distributable to other consumer goods. Simple adjustments to the design and production of aluminum cans increase the resource productivity of aluminum. The weight of cans has been reduced by 40 percent, increasing the number of cans that can be made per ton of parent bauxite ore. Reducing the diameter of can rims by one-eighth of an inch has saved Anheuser-Busch 21 million pounds of aluminum a year. A new process that eliminates the chemical spraying of cans saves “99.7 percent of the wasted materials and 62 percent of the energy needed for preparing aluminum beverage cans for filling” (Hawken, Lovins, and Lovins 76). Using virgin ore is twenty times more energy intensive than using recycled aluminum, which should create incentive to collect and recycle aluminum waste. Only two-fifths of U.S. aluminum is produced from recycled material, however, leaving

room for further energy cost savings by increasing the amount of recycled aluminum used (Hawken, Lovins, and Lovins 50).

Thus, increasing resource productivity has inseparable economic and environmental benefits. There are innumerable ways, ranging from simple, quick adjustments to replacing entire machines and remodeling factories, to use fewer energy and material resources to produce an equal or greater number of products. Decreased demand for inputs slows worldwide resource depletion, while more efficient processes put more material into the product and release less as pollution and waste. Hand-in-hand with slowed environmental degradation is lowered costs for business and society. Businesses reduce intake of raw materials and save money on waste disposal and environmental compliance; depending on the circumstances, waste can be sold for other purposes, earning profits on what would have been otherwise discarded. With enough savings, businesses can offer lower-priced goods to consumers and gain a competitive edge in national and international markets (Hawken, Lovins, and Lovins 10-4).

Quality of life for society at large can also be improved. The heat, noise, and pollution that foul the air, land, and water and make life unpleasant are all signs of wasted energy, resources, and money. Reducing this waste creates a healthier, more peaceful world in which to live and enjoy life. On a grander scale, the benefits to the environment are vast. A reduction in resource use and waste production lessens the release of harmful pollutants and emissions that drive environmental problems like global warming and depletion of the ozone layer. In addition to cheaper goods and an improved environment, businesses can also hire new employees and offer higher wages and benefits to existing

employees instead of spending billions on wasted resources (Hawken, Lovins, and Lovins 10-3). The ability of resource productivity to create jobs and put money in someone's pocket has much more power today than any environmental plea. Where other policies have failed or caused a rift between business and environmental interests, methods and technology to increase resource productivity have the potential to succeed in joining economic prosperity with environmental sustainability. The advantages of coupling economic and environmental betterment are further increased by increasing energy efficiency.

### ***Energy Efficiency***

Energy consumption is responsible for over 80 percent of the greenhouse gas emissions that contribute to climate change (Goldstein 4). Increasing energy efficiency in homes, industries, cars, and buildings, however, has the potential to decrease the rate of carbon emissions by one-third to nine-tenths below the rate in 1999, even if the economy continued to expand 6- to 8-fold (Hawken, Lovins, and Lovins 244). Energy efficiency entails making adjustments to buildings or machinery that reduce the amount of energy needed to function. This encompasses a wide range of practices that increase an object or material's ability to produce, retain, or reduce heat and energy.

Energy usage in buildings, such as homes and offices, can be drastically reduced by making several structural improvements. Installing better insulation, leak-free heating and cooling duct systems, and windows that reflect heat and insulate against cold can reduce energy use by 30 to 50 percent in homes, 20 to 30 percent in existing buildings,

and over 50 percent in new buildings. The use of energy efficient appliances in homes and buildings can further reduce energy use by 50 percent or more (Goldstein 6-7).

Washing machines, for example, have been re-engineered to reduce the amount of heat and water needed to clean clothes. Instead of filling the entire tub with hot water and dragging clothes around with an agitator, clothes can be sprinkled with water or dropped into a small amount of water at the bottom of the basin. The energy needed is reduced by over two-thirds. In addition to reduced energy use, water consumption is reduced by half, less detergent is needed, and fabric life is extended (Goldstein 11).

One of the greatest success stories of home energy efficiency is the refrigerator. From the 1950's to the 1970's, ownership of refrigerators steadily increased, as did energy consumption per refrigerator. Energy use by refrigerators increased with their size, number of features, and performance until the refrigerator became the largest single electricity user in a household in 1973. A \$500 refrigerator was consuming over \$2,000 in energy over its lifetime. The energy crisis of 1973 and consequent concerns pushed state and federal lawmakers to enact appliance efficiency standards. Despite arguments by manufacturers that energy reduction goals were technically impossible, by 2002 refrigerator energy consumption had been reduced to less than one-fourth that of its 1970's counterpart (Goldstein 30-8). In addition to reducing fossil fuel consumption and the accompanying environmental problems, ozone-depleting chemicals have also been eradicated from production. Consumers worldwide benefit from halted environmental degradation. Perhaps most tangibly important to customers, however, is a 50 percent reduction in price while increasing size and range of special features (Goldstein 73).

The actual and potential innovations of energy efficiency extend beyond the home and office as well. There are many ways to improve energy efficiency in industry. Most energy is lost through motor energy, drive systems, and heat energy. Since energy is lost when a motor has to completely restart every time it is used, wasted energy can be reduced by designing more efficient motors that have speeds other than “off” or maximum capacity. Energy used for drive systems and heat is conserved by stopping leakages, using higher efficiency equipment, and insulating pipes (Goldstein 52). Heat can also be captured and reused. By using heat at the specific temperature required for a process and then recovering it, industries can recover the cost of retrofitting systems in as little as six months. New technologies are creating new materials, techniques, software, and electronics that continually reduce energy consumption and the cost of doing so (Hawken, Lovins, and Lovins 63-5). Expensive, complicated technology can be almost completely bypassed, however, by designing energy efficiency into a system from the beginning.

Engineer Jan Schilham was able to reduce the pumping power of a carpet-making factory from 95 horsepower to 7 horsepower, a 92 percent reduction, while decreasing costs and increasing performance by improving the factory’s design. Using bigger pipes reduced friction, requiring smaller pumps and motors and reducing initial equipment costs, as well as reduced pumping energy consumption. Furthermore, he designed the most efficient layout of pipes before installing machinery and equipment. This eliminated all of the extra twists, turns, and length that would be required in a traditional set-up, which placed equipment first, then connected it all with pipes. In addition to

reducing pumping energy by 92 percent and lowering capital costs, Schilham's design innovation yielded the following added benefits: “simpler and faster construction, less use of floor space, more reliable operation, easier maintenance, and better performance.” Design engineering can achieve energy efficiency without employing any new technologies or different equipment. All of the pumps and pipes in Schilham's carpet-making factory would have been used anyway; he simply chose to make them as efficient, and as inexpensive, as possible (Hawken, Lovins, and Lovins 116-17).

As explained throughout this section, the potential to save money and natural resources through increased energy efficiency is huge and accompanied by numerous direct and indirect benefits. Once a business decides to examine its production process for opportunities to improve energy efficiency, it tends to bring attention to a wide range of other potential improvements. For example, installing more efficient motors and furnaces brings attention to heat lost through pipes, so thermal insulation of pipes then becomes a project. While insulating pipes, leaks and other repairs to heating and cooling ducts are discovered. If workers are going to be working on the roof and in ceilings, might as well install more efficient lighting fixtures and light bulbs while they are already there. All of these changes drive further innovation to continue decreasing capital and operating costs, saving money for businesses and consumers (Goldstein 12-4).

For businesses and their investors, initial investment in energy efficiency typically recovers its initial costs in as little as two to three years, and then, through reduced costs, continues to generate profits year after year. In an economy shaken by bad investments like subprime lending, energy efficiency has a solid economic outlook. Based only on

direct energy savings to the consumer, energy-efficient investments have the potential to generate trillions of dollars for the American economy. Energy efficiency reduces the amount of energy demanded, lowering energy costs for all consumers in the market. Reduced demand also increases America's ability to rely on its own fossil fuel and alternative energy resources for its energy needs, decreasing dependence on fuel resources in unstable, often hostile foreign nations (Goldstein 6-7).

In an economy where 10.2 percent of Americans are unemployed, the job creation benefits of energy efficiency can be a source of income and hope for millions of people (Fletcher and Irwin). Workers are needed to assess, design, and renovate homes, buildings, and industrial facilities for energy efficiency. Domestic energy sector jobs are increased as demand for foreign oil decreases and jobs are brought back to American soil. Energy efficiency also creates jobs in the same basic manner as resource productivity. Business costs are reduced to the point of generating a profit, enabling companies to employ more people with higher wages and benefits. Workers, who are already saving money on energy costs, are more likely and able to spend money on other consumer goods, which stimulates the entire economy (Goldstein 8-9).

Benefits to the global environment accompany the economic growth of energy efficiency. Decreased demand for fossil fuels slows resource depletion and decreases the amount of drilling, mining, and extracting that disturbs and pollutes ecosystems around the world. Reduced and more efficient burning of fossil fuels decreases the amount of sulfur oxides, nitrogen oxides, volatile organic compounds, carbon monoxide, carbon dioxide, and particulate matter polluting the air. Lower consumption of foreign fuel

resources reduces worldwide oceanic shipping and therefore the likelihood of disastrous oil spills. On land, fewer habitats are fragmented by pipelines and roads, avoiding significant disturbance to plants and wildlife. Most importantly, environmental improvement driven by decreased energy use comes at no sacrifice to the economic benefits outlined above (Goldstein 4).

In the business world, environmental considerations have historically been thought of as harmful to industry by restricting options and increasing costs, but resource productivity and energy efficiency exhibit benefits directly opposite to this thinking. These business practices can increase wealth, create jobs, and drive technological innovation, establishing a new system of production that has not only the ability to revive the current world economy, but to sustain humankind economically and environmentally far into the future.

## **Chapter 3**

### **Conclusion**

The true wonder of resource productivity and energy efficiency is that they do not have to be employed separately. Increasing an industry's resource productivity does not mean it cannot become more energy efficient and vice versa. The combined power of resource productivity and energy efficiency results in even stronger solutions to two of the largest global problems of our time: economic revitalization and environmental sustainability. Adopting these practices is more necessary today than ever before considering the recent economic downturn and building threat of global climate change. Resource productivity and energy efficiency produce additional societal and political benefits that all work to reduce obstacles into worthwhile environmental opportunities despite the economic downturn.

#### ***Additional Benefits***

By allowing business incentives to drive environmental betterment, the pressure on national and international governing bodies to devise environmental solutions is greatly reduced. In the United States, the House of Representatives has passed a bill to reduce carbon dioxide emissions, but the Senate is still struggling to produce similar legislation (McFarland). Concrete legislative emissions targets set by the U.S. are important for progress at the meeting of 192 countries in Copenhagen, Denmark, in

December of 2009 to discuss a global climate change agreement (Eilperin). With the ability to increase savings and profits by businesses and reduce harm to the environment, widespread support of national and international agreements that included resource productivity and energy efficiency would be more easily obtained.

Tax rebates and other incentives could be created to encourage businesses to make their operations more productive and efficient. The creation of national or private agencies that specialize in resource productivity and energy efficiency assessment would reduce the burden on businesspeople to be able to identify potential improvements. Once design, equipment, and other changes are made, businesses quickly recoup initial investment costs and continue to make a profit on their investment in following years. The investment incentives and benefits explained in Chapter 2 are very straightforward, simplifying a process that almost always becomes messy and convoluted in government legislation and regulation.

The carbon dioxide emissions reductions schemes being proposed in the U.S. Congress involve complex market schemes of cap-and-trade that aim to make businesses pay to emit carbon dioxide (McFarland). Though encouraging industries to find innovative ways to reduce carbon dioxide emissions, cap-and-trade proposals lack the large package of economic and environmental benefits that accompany resource productivity and energy efficiency. The core production system is left intact, instead of fundamentally reducing the need for resources and generation of waste and pollution. Businesses, in turn, do not benefit from lowered material and operating costs, more employees, and savings on disposal and environmental clean-up fees. The work of

governments could be greatly reduced by encouraging developments that drive both economic and environmental improvements.

The national security of the U.S. is also closely tied to energy efficiency. America's current insatiable appetite for oil is being fed by oil fields in many unstable, hostile, and undemocratic foreign nations. Purchasing foreign oil pumps billions of dollars into the economies of these nations, doing nothing to better the domestic economy or secure reliable sources of energy in case of international disputes or other supply disruptions. The continued burning of foreign fossil fuels contributes to climate change, which also endangers U.S. national security. Senator Barbara Boxer brings attention to these issues in her opening remarks at the U.S. Senate Committee on Environment and Public Works hearing entitled "Climate Change and National Security" in July 2009:

[L]ast September, the NATO Secretary General said that global warming will "...sharpen the competition over resources, notably water; it will increase the risks to coastal regions; it will provoke disputes over territory and farming land; it will spur migration; and it will make fragile states even more fragile."

In addition to the destabilizing impacts that global warming will bring -- shortages of food production due to drought, shrinking supplies of clean water as glaciers recede, displacement of people from low-lying areas as sea levels rise -- we must also address the ways in which our dependence on oil makes us more vulnerable.

A May 2009 report by retired U.S. Generals and Admirals... stated

that “a business as usual approach to energy security poses an unacceptably high threat level from a series of converging risks.”

Increasing energy efficiency is vital in reducing both dependence on foreign oil and carbon emissions that cause global warming. Risks to national security can be greatly reduced by transforming current systems of production from dangerous to advantageous (Goldstein 4). The transformation of production systems is not without obstacles, however. Obstacles exist in the implementation of resource productivity and energy efficiency, but the benefits are ultimately achievable and worthwhile.

### ***Obstacles***

One might think the biggest obstacles in increasing resource productivity and energy efficiency would be technology or information, but this is not the case. In the economic downturn that could be uplifted by these innovations, money is the biggest obstacle. With decreased sales, companies are being forced to take measures to save money, such as laying off employees, instead of spending money on renovations and improvements. This only perpetuates the cycle of decreased consumption and production in an economic depression. The more stringent lending practices caused by the failures in banking and lending institutions are making it difficult to borrow the capital needed to make initial investments in productivity and efficiency (International Monetary Fund 3-7). Without the money to make changes, industries cannot begin to reduce costs, create jobs, and revitalize the economy.

Capital would be available, however, if it were diverted from government

subsidies paid to harmful industries to investment incentives for resource productivity and energy efficiency projects. American taxpayers pay trillions of dollars to the federal government, who in turn uses it to perpetuate the industries that are causing the most harm to the environment and society. The automobile, farming, drilling, mining, logging, and energy industries use government subsidies to keep the price of their products affordable, artificially lowering the cost of the resources used. Taxpayer money is then used to clean up and remediate the environmental damage caused by these industries. Instead of using billions of dollars to keep the most environmentally destructive businesses viable, that money could be used to motivate businesses to move in a different direction (Hawken, Lovins, and Lovins 159-63).

Investments in resource productivity and energy efficiency do not require a perpetual life support system to remain viable. Initial investments can be recovered in as little as two to three years and, once recovered, businesses continuously save on material and energy costs (Goldstein 6-7). Furthermore, the resulting decrease in resource intake would reduce the need for more drilling, mining, and logging, saving the government the expense of keeping these industries afloat and benign. Taxpayers could then see more benefits from their money instead of watching it disappear into the coffers of environmentally-degrading industries. The capital to overcome the obstacle of making initial investments in resource productivity and energy efficiency is available, and would benefit society much more if it were spent on transforming current systems of production into sustainable ones, not keeping them artificially viable.

### *The Time to Act*

The concept of increasing resource productivity and energy efficiency to enhance the economy and environment is not new. A book from 1981 on energy efficiency states, “This book proposes a different approach to ecological management: pursuit of technical change that emphasizes resource conservation instead of resource exploitation” (Ross and Williams 255). This statement follows an entire book outlining and calling for increased energy efficiency practices similar to those outlined in Chapter 2. Twelve years later, an author wrote in a 1993 publication:

Addressing environmental concerns at the front end of the manufacturing cycle is almost always cheaper and easier than solving back-end environmental problems. Using different materials with less long-term polluting potential, and using less-polluting procedures to turn these materials into finished goods, just plain costs less money overall.  
  
(Silverstein 189)

It is remarkable that, despite the information being put forth in these two books and many similar ones, society has progressed to its current level of economic depression and environmental degradation.

Years and years have passed, technology has progressed substantially, and still changes are not made. Environmental safeguards have been considered a hindrance to industry by restricting options and increasing costs, but with unemployment reaching 10.2 percent in November 2009 and the national deficit in excess of \$11 trillion, something needs to change (Fletcher and Irwin; Raum and Taylor). Ignoring proposals to

link economic growth and environmental sustainability has benefited the minority and harmed the majority of the world's citizens. Society is speeding toward the brink of economic and environmental catastrophe. It is now time to change. It is now time to reexamine detrimental production systems and finally work to make them better serve society. Instituting resource productivity and energy efficiency practices can increase wealth, create jobs, drive technological innovation, and enhance national security, establishing a new system of production that has not only the ability to revive the current world economy, but to sustain mankind economically and environmentally far into the future.

Economic stability and growth has and always will rely on the environment. Continued or enhanced misuse and overextension of natural resources at this time would seriously undermine economic longevity. Furthermore, the ability of resource productivity and energy efficiency to create jobs and put money in someone's pocket has much more power today than any environmental plea. Where other policies have failed or caused a rift between business and environmental interests, methods and technology to increase resource productivity and energy efficiency have the potential to succeed in joining economic prosperity with environmental sustainability. With a wide array of economic, environmental, and political benefits and ways to overcome investment obstacles, industry needs to employ resource productivity and energy efficiency improvements now in order to reap economic benefits and drive inherent environmental improvements.

The economic downturn has created a unique set of circumstances that make it

economically advantageous to restructure current industries and processes that are damaging the environment. People need jobs right now to keep a roof over their head and food on the table. In the effort to create jobs and revitalize the economy, why not use mechanisms that also ensure a better, more sustainable environment? Solutions that help to restore both the economy and the environment are available to industries: increasing resource productivity and energy efficiency. The numerous economic, environmental, and political benefits generated by increased resource productivity and energy efficiency make these mechanisms a powerful solution to the world's economic and environmental woes. Many are working towards separate economic or environmental solutions, but efforts need to be linked in order to emerge from this economic crisis better than before with decreased unemployment and a sustainable future.

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