

from *Plan B 4.0: Mobilizing to Save Civilization*, by Lester R. Brown
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III

THE GREAT MOBILIZATION

Can We Mobilize Fast Enough?

There is much that we do not know about the future. But one thing we do know is that business as usual will not continue for much longer. Massive change is inevitable. “The death of our civilization is no longer a theory or an academic possibility; it is the road we’re on,” says Peter Goldmark, former Rockefeller Foundation president and current director of the climate program at the Environmental Defense Fund (EDF). Can we find another road before time runs out?¹

The notion that our civilization is approaching its demise is not an easy concept to grasp or accept. It is difficult to imagine something we have not previously experienced. We hardly have the vocabulary, much less the experience, to discuss this prospect. We know which economic indicators to watch for signs of an economic recession, such as declining industrial output, rising unemployment, or falling consumer confidence, but we do not follow a similar set of indicators that signal civilizational collapse.

Given the role of food shortages in earlier civilizational declines, we obviously should watch food price and hunger trends closely. The growing number of hungry people, the pro-

jected continuation of this trend, and the lack of a plan to reverse it should be a matter of concern to political leaders everywhere.²

Neither spreading hunger nor the threat of it unfolds in a political vacuum. Affluent grain-importing countries are buying large tracts of land in poorer countries in the emerging cross-border competition for control of land and water resources. This opens a new chapter in the geopolitics of food scarcity. Where ultimately does this lead? We do not know. We have not been here before.

In many ways, the most basic indicator of our plight is the number of failing states. Each year this list grows longer. How many states must fail before our global civilization begins to unravel? Again, we do not know the answer because we have not been here before.

Our future depends on reversing both the spread of hunger and the growing number of failing states, but this will not happen if we continue with business as usual. Turning this situation around will take a worldwide, wartime-like mobilization. We call it Plan B. This plan, or something similar to it, is our only way out.

Plan B embraces a massive mobilization to restructure the world economy—and at wartime speed. The closest analogy is the belated U.S. mobilization during World War II. But unlike that chapter in history, in which one country totally restructured its industrial economy in a matter of months, the Plan B mobilization requires decisive action on a global scale.

The four mutually dependent Plan B goals—stabilizing climate, stabilizing population, eradicating poverty, and restoring the economy's natural support systems—are all essential to restoring food security. It's unlikely that we can reach any one without reaching the others.

Eradicating poverty is not only the key to population stabilization, political stabilization, and a better life, it also provides hope. As Nobel laureate Mohammed Yunus, founder of the Grameen Bank for micro-credit in Bangladesh, has pointed out, "Poverty leads to hopelessness, which provokes people to desperate acts."³

Stabilizing population not only helps eradicate poverty, it makes it easier to reach almost every other goal that we seek. On

a finite planet, where we are pushing the earth beyond its limits, every country should have a population stabilization policy.

As noted in Chapter 7, international assistance programs require a special initiative, a unique component, to rescue failing states. Just as hospitals have intensive care units that give special attention to the most seriously ill, so too international assistance programs need a special facility to deal with seriously ill nation states.

We know from our analysis of climate change, from the accelerating deterioration of the economy's ecological supports, and from our projections of future resource use that the western economic model—the fossil-fuel-based, automobile-centered, throwaway economy—will not last much longer. We need to build a new economy, one that will be powered by renewable sources of energy, that will have a diversified transport system, and that will reuse and recycle everything.

We can describe this new economy in some detail. The question is, How do we get from here to there before time runs out? In effect, we are in a race between political tipping points and natural tipping points. Can we reach the political tipping point that will enable us to cut carbon emissions before we reach the point where the melting of the Himalayan glaciers becomes irreversible? Will we be able to halt the deforestation of the Amazon before it dries out, becomes vulnerable to fire from natural causes, and turns into wasteland?

The key to building a global economy that can sustain economic progress is the creation of an honest market, one that tells the ecological truth. To create an honest market, we need to restructure the tax system by reducing taxes on work and raising those on carbon emissions and other environmentally destructive activities, thus incorporating indirect costs into the market price.

If we can get the market to tell the truth, then we can avoid being blindsided by a faulty accounting system that leads to bankruptcy. As Øystein Dahle, former Vice President of Exxon for Norway and the North Sea, has observed: "Socialism collapsed because it did not allow the market to tell the economic truth. Capitalism may collapse because it does not allow the market to tell the ecological truth."⁴

Some countries are recognizing the need for bold dramatic

change. Several governments have announced that they plan to become carbon-neutral, including Norway, Costa Rica, and the Maldives. They have formally joined the Climate Neutral Network launched by the U.N. Environment Programme (UNEP) in 2008. The Maldives, a low-lying island country of 385,000 people that is threatened by rising seas, is on a fast track, planning to systematically develop its wind and solar resources to replace fossil fuels and reach carbon neutrality by 2019. Costa Rica is shooting for 2021. The Maldives and Costa Rica are the first countries to adopt a carbon reduction goal more ambitious than that of Plan B.⁵

Achim Steiner, Executive Director of UNEP, describes climate neutrality as “an idea whose time has come, driven by the urgent need to address climate change but also the abundant economic opportunities emerging for those willing to embrace a transition to a Green Economy.” By far the most effective policy tool in striving for carbon neutrality is restructuring taxes and subsidies.⁶

Shifting Taxes and Subsidies

The need for tax shifting—lowering taxes on income while raising those on environmentally destructive activities—has been widely endorsed by economists. For example, a tax on coal that incorporates the increased health care costs associated with mining it and breathing the air it pollutes, the costs of damage from acid rain, and the costs of climate disruption would encourage investment in clean renewable sources of energy such as wind and solar.⁷

A market that is allowed to ignore the indirect costs in pricing goods and services is irrational, wasteful, and self-destructive. The first step in creating an honest market is to calculate indirect costs. Perhaps the best model for this is a U.S. government study on smoking from the Centers for Disease Control and Prevention (CDC). In 2006 the CDC calculated the cost to society of smoking cigarettes—including both the cost of treating smoking-related illnesses and the lost worker productivity from these illnesses—at \$10.47 per pack.⁸

This calculation provides a framework for raising taxes on cigarettes. In New York City, smokers now pay \$4.25 per pack in state and local cigarette taxes. Chicago is not far behind at

\$3.66 per pack. Among states, Rhode Island has the highest tax at \$3.46 per pack. Since a 10-percent price rise typically reduces smoking by 4 percent, the health benefits of tax increases are substantial.⁹

For a gasoline tax, the most detailed analysis available of indirect costs is found in *The Real Price of Gasoline* by the International Center for Technology Assessment. The many indirect costs to society—including climate change, oil industry tax breaks, oil supply protection, oil industry subsidies, and treatment of auto exhaust-related respiratory illnesses—total around \$12 per gallon (\$3.17 per liter), marginally more than the cost to society of smoking a pack of cigarettes. If this external or social cost is added to the roughly \$3 per gallon average price of gasoline in the United States, a gallon would cost \$15. These are real costs. Someone bears them. If not us, our children.¹⁰

Gasoline’s indirect cost of \$12 a gallon provides a reference point for raising taxes to where the price reflects the environmental truth. Gasoline taxes in Italy, France, Germany, and the United Kingdom—averaging \$4 per gallon—are a good start. The average U.S. gas tax of 46¢ per gallon, scarcely one tenth that in Europe, helps explain why the United States uses more gasoline than the next 20 countries combined. The high gasoline taxes in Europe have contributed to an oil-efficient economy and to far greater investment in high-quality public transportation over the decades, making it less vulnerable to oil supply disruptions.¹¹

Phasing in an incremental gasoline tax rising by 40¢ per gallon per year for the next 10 years and offsetting it with a reduction in income taxes would raise the U.S. gas tax to the \$4 per gallon tax prevailing today in Europe. This will still fall short of the \$12 of indirect costs currently associated with burning a gallon of gasoline, but combined with the rising price of producing gasoline and the far smaller carbon tax discussed earlier, it should be enough to encourage motorists to use improved public transport and to buy the plug-in hybrid and all-electric cars as they come to market, starting in 2010.

These carbon and gasoline taxes may seem high, but again we look to smoking for at least one dramatic precedent. A series of lawsuits led the U.S. tobacco industry in November of 1998 to agree to reimburse state governments with a cumulative sum

of \$251 billion for the Medicare costs of treating smoking-related illnesses—nearly \$1,000 for every person in the United States. This landmark agreement was, in effect, a retroactive tax on cigarettes smoked in the past, one designed to cover indirect costs. To pay this enormous bill, companies raised cigarette prices, bringing them closer to their true costs and further discouraging smoking.¹²

Tax shifting is not new in Europe. A four-year plan adopted in Germany in 1999 systematically shifted taxes from labor to energy. By 2003, this plan had reduced annual carbon dioxide (CO₂) emissions by 20 million tons and helped to create approximately 250,000 additional jobs. It also accelerated growth in the renewable energy sector; by 2006 there were 82,100 jobs in the wind industry alone, a number that is projected to rise by another 60,000 jobs by 2010.¹³

Between 2001 and 2006, Sweden shifted an estimated \$2 billion of taxes from income to environmentally destructive activities. Much of this shift of \$500 or so per household was levied on road transport, including hikes in vehicle and fuel taxes. France, Italy, Norway, Spain, and the United Kingdom are among the countries also using this policy instrument. In Europe and the United States, polls indicate that at least 70 percent of voters support environmental tax shifting once it is explained to them.¹⁴

Some 2,500 economists, including nine Nobel Prize winners in economics, have endorsed the concept of tax shifts. Harvard economics professor and former chairman of George W. Bush's Council of Economic Advisors N. Gregory Mankiw wrote in *Fortune* magazine: "Cutting income taxes while increasing gasoline taxes would lead to more rapid economic growth, less traffic congestion, safer roads, and reduced risk of global warming—all without jeopardizing long-term fiscal solvency. This may be the closest thing to a free lunch that economics has to offer."¹⁵

Environmental taxes are now being used for several purposes. Landfill taxes that discourage waste and encourage recycling are becoming more common. A number of cities are now taxing cars that enter the city. Others are simply imposing a tax on automobile ownership. In Denmark, the registration tax on the purchase of a new car exceeds the price of the car by 180 per-

cent. A new car that sells for \$20,000 costs the buyer \$56,000. In Singapore, the tax on a \$14,200 Ford Focus, for example, more than triples the price, pushing it to \$45,500. Other governments are moving in this direction. In Shanghai, the registration fee in 2009 averaged \$4,500 per car.¹⁶

Cap-and-trade systems using tradable permits are sometimes an alternative to environmental tax restructuring. The principal difference between them is that with permits, governments set the amount of a given activity that is allowed, such as the harvest from a fishery, and let the market set the price of the permits as they are auctioned off. With environmental taxes, in contrast, the price of the environmentally destructive activity is incorporated in the tax rate, and the market determines the amount of the activity that will occur at that price. Both economic instruments can be used to discourage environmentally irresponsible behavior.

The use of cap-and-trade systems with marketable permits has been effective at the national level, ranging from restricting the catch in an Australian fishery to reducing sulfur emissions in the United States. For example, the government of Australia, concerned about lobster overharvesting, estimated the sustainable yield of lobsters and issued catch permits totaling that amount. Fishers could then bid for these permits. In effect, the government decided how many lobsters could be taken each year and let the market decide what the permits were worth. Since the permit trading system was adopted in 1992, the fishery has stabilized and appears to be operating on a sustainable basis.¹⁷

Although tradable permits are popular in the business community, permits are administratively more complicated and not as well understood as taxes. Edwin Clark, former senior economist with the White House Council on Environmental Quality, observes that tradable permits "require establishing complex regulatory frameworks, defining the permits, establishing the rules for trades, and preventing people from acting without permits." In contrast to paying taxes, something with which there is wide familiarity, tradable permits are a concept not widely understood by the public, making it more difficult to generate broad public support.¹⁸

The other side of the tax shifting coin is subsidy shifting. Each year the world's taxpayers provide an estimated \$700 bil-

lion of subsidies for environmentally destructive activities, such as fossil fuel burning, overpumping aquifers, clearcutting forests, and overfishing. An Earth Council study, *Subsidizing Unsustainable Development*, observes that “there is something unbelievable about the world spending hundreds of billions of dollars annually to subsidize its own destruction.”¹⁹

Carbon emissions could be cut in scores of countries by simply eliminating fossil fuel subsidies. Iran provides a classic example of extreme subsidies when it prices oil for internal use at one tenth the world price, strongly encouraging car ownership and gas consumption. If its \$37-billion annual subsidy were phased out, the World Bank reports, Iran’s carbon emissions would drop by a staggering 49 percent. This move would also strengthen the economy by freeing up public revenues for investment in the country’s economic development. Iran is not alone. The Bank reports that removing energy subsidies would reduce carbon emissions in India by 14 percent, in Indonesia by 11 percent, in Russia by 17 percent, and in Venezuela by 26 percent.²⁰

Some countries are already doing this. Belgium, France, and Japan have phased out all subsidies for coal. Germany reduced its coal subsidy from a high of 6.7 billion euros in 1996 to 2.5 billion euros in 2007. Coal use dropped by 34 percent between 1991 and 2006. Germany plans to phase out this support entirely by 2018. As oil prices have climbed, a number of countries have greatly reduced or eliminated subsidies that held fuel prices well below world market prices because of the heavy fiscal cost. Among these are China, Indonesia, and Nigeria.²¹

A study by the U.K. Green Party, *Aviation’s Economic Downside*, describes subsidies to the U.K. airline industry. The giveaway begins with \$18 billion in tax breaks, including a total exemption from the national tax. External or indirect costs that are not paid, such as treating illness from breathing the air polluted by planes, the costs of climate change, and so forth, add nearly \$7.5 billion to the tab. The subsidy in the United Kingdom totals \$426 per resident. This is also an inherently regressive tax policy simply because a part of the U.K. population cannot afford to fly, yet they help subsidize this high-cost travel for their more affluent compatriots.²²

While some leading industrial countries have been reducing subsidies to fossil fuels—notably coal, the most climate-dis-

rupting of all fuels—the United States has increased its support for the fossil fuel and nuclear industries. Doug Koplow, founder of Earth Track, calculated in a 2006 study that annual U.S. federal energy subsidies have a total value to the industry of \$74 billion. Of this, the oil and gas industry gets \$39 billion, coal \$8 billion, and nuclear \$9 billion. He notes that since 2006 these numbers “would likely be a good deal higher.” At a time when there is a need to conserve oil resources, U.S. taxpayers are subsidizing their depletion.²³

A world facing economically disruptive climate change can no longer justify subsidies to expand the burning of coal and oil. Shifting these subsidies to the development of climate-benign energy sources such as wind, solar, biomass, and geothermal power will help stabilize the earth’s climate. Shifting subsidies from road construction to rail construction could increase mobility in many situations while reducing carbon emissions. And shifting the \$22 billion in annual fishing industry subsidies, which encourage destructive overfishing, to the creation of marine parks to regenerate fisheries would be a giant step in restoring oceanic fisheries.²⁴

In a troubled world economy, where many governments are facing fiscal deficits, these proposed tax and subsidy shifts can help balance the books, create additional jobs, and save the economy’s eco-supports. Tax and subsidy shifting promises greater energy efficiency, cuts in carbon emissions, and reductions in environmental destruction—a win-win-win situation. A carbon tax on coal, for example, that fully incorporated the climate and health costs of burning it would lead to a quick phaseout.

Coal: The Beginning of the End

The past two years have witnessed the emergence of a powerful movement opposing the construction of new coal-fired power plants in the United States. Initially led by environmental groups, both national and local, it has since been joined by prominent national political leaders and many state governors. The principal reason for opposing coal plants is that they are changing the earth’s climate. There is also the effect of mercury emissions on health and the 23,600 U.S. deaths each year from power plant air pollution.²⁵

Over the last few years the coal industry has suffered one setback after another. The Sierra Club, which has kept a tally of proposed coal-fired power plants and their fates since 2000, reports that 101 plants have been defeated, with another 59 facing opposition in the courts. Of the 229 plants being tracked, only 23 currently have a chance at gaining the permits necessary to begin construction and eventually come online. Building a coal plant may soon be impossible.²⁶

What began as a few local ripples of resistance to coal-fired power quickly evolved into a national tidal wave of grassroots opposition from environmental, health, farm, and community organizations. In a national poll by the Opinion Research Corporation that asked which electricity source people would prefer, only 3 percent chose coal. Despite a heavily funded ad campaign to promote so-called clean coal (one reminiscent of the tobacco industry's earlier efforts to convince people that cigarettes were not unhealthy), the American public is turning against coal.²⁷

One of the first major industry setbacks came in early 2007 when a grassroots movement took on Texas-based utility TXU. A coalition headed by the Environmental Defense Fund led a damaging public campaign against plans for 11 new coal-fired power plants. A quick drop in the utility's stock price caused by the media storm prompted a \$45-billion buyout offer from the private equity firms Kohlberg Kravis Roberts and Company and Texas Pacific Group. Only after negotiating a ceasefire with EDF and the Natural Resources Defense Council and reducing the number of proposed plants from 11 to 3, thus preserving the value of the company, did the firms proceed with purchasing the utility. It was a major win for the environmental community, which mustered the public support necessary to stop 8 plants outright and impose stricter regulations on the remaining 3. Meanwhile, the energy focus in Texas has shifted to developing its vast resources of wind energy, pushing it ahead of California in wind-generated electricity.²⁸

In May 2007, Florida's Public Service Commission refused to license a huge \$5.7 billion, 1,960-megawatt coal plant because the utility could not prove that building the plant would be cheaper than investing in conservation, efficiency, and renewable energy sources. This point, made by Earthjustice, a non-profit environmental legal group, combined with widely

expressed public opposition to any more coal-fired power plants in Florida, led to the quiet withdrawal of four other coal plant proposals in the state.²⁹

Coal's future is also suffering as Wall Street turns its back on the industry. In July 2007, Citigroup downgraded coal company stocks across the board and recommended that its clients switch to other energy stocks. In January 2008, Merrill Lynch also downgraded coal stocks. In early February 2008, investment banks Morgan Stanley, Citi, and J.P. Morgan Chase announced that any future lending for coal-fired power would be contingent on the utilities demonstrating that the plants would be economically viable with the higher costs associated with future federal restrictions on carbon emissions. Later that month, Bank of America announced it would follow suit.³⁰

In August 2007, coal took a heavy political hit when U.S. Senate Majority Leader Harry Reid of Nevada, who had been opposing three coal-fired power plants in his own state, announced that he was now against building coal-fired power plants anywhere in the world. Former Vice President Al Gore has also voiced strong opposition to building any coal-fired power plants. So too have many state governors, including those in California, Florida, Michigan, Washington, and Wisconsin.³¹

In her 2009 State of the State address, Governor Jennifer Granholm of Michigan argued that the state should not be importing coal from Montana and Wyoming but instead should be investing in technologies to improve energy efficiency and to tap the renewable resources within Michigan, including wind and solar. This, she said, would create thousands of jobs in the state, helping offset those lost in the automobile industry.³²

December 2008 brought another major coal industry setback. One of the unresolved burdens haunting this sector, in addition to the emissions of CO₂, is what to do with the coal ash—the remnant of burning coal—that is accumulating in 194 landfills and 161 holding ponds in 47 states. This ash is not an easy material to dispose of since it is laced with arsenic, lead, mercury, and many other toxic materials. The industry's dirty secret came into full public view just before Christmas 2008 when the containment wall of a coal ash pond in eastern Tennessee released a billion gallons of toxic brew.³³

Unfortunately, the industry does not have a plan for safely

disposing of the 130 million tons of ash produced each year, enough to fill 1 million railroad cars. The dangers are such that the Department of Homeland Security tried to put 44 of the most vulnerable storage facilities on a classified list lest they fall into the hands of terrorists. The spill of toxic coal ash in Tennessee drove another nail into the lid of the coal industry coffin.³⁴

In April 2009, the chairman of the powerful U.S. Federal Energy Regulatory Commission, Jon Wellinghoff, observed that the United States may no longer need any additional coal or nuclear power plants. Regulators, investment banks, and political leaders are now beginning to see what has been obvious for some time to climate scientists such as NASA's James Hansen, who says that it makes no sense to build coal-fired power plants when we will have to bulldoze them in a few years.³⁵

In April 2007, the U.S. Supreme Court ruled that the Environmental Protection Agency (EPA) is both authorized and obligated to regulate CO₂ emissions under the Clean Air Act. This watershed decision prompted the Environmental Appeals Board of the EPA in November 2008 to conclude that a regional EPA office must address CO₂ emissions before issuing air pollution permits for a new coal-fired power plant. This not only put the brakes on the plant in question but also set a precedent, stalling permits for all other proposed coal plants across the United States. Acting on the same Supreme Court decision, in March 2009 the EPA submitted an endangerment finding to the White House Office of Management and Budget. It confirmed that CO₂ emissions threaten human health and welfare and must be regulated, jeopardizing new coal plants everywhere.³⁶

The bottom line is that the United States now has, in effect, a de facto moratorium on the building of new coal-fired power plants. This has led the Sierra Club, the national leader on this issue, to expand its campaign to reduce carbon emissions to include the closing of existing plants.³⁷

Given the huge potential for reducing electricity use in the United States, as noted in Chapter 4, this may be much easier than it appears. If the efficiency level of the other 49 states were raised to that of New York, the most energy-efficient state, the energy saved would be sufficient to close 80 percent of the country's coal-fired power plants. The few remaining plants could be shut down by turning to renewable energy—wind farms, solar

thermal power plants, solar cell rooftop arrays, and geothermal power and heat.³⁸

The handwriting is on the wall. In 2008, only five small coal-fired power plants that were in the planning stage for years were completed, adding 1,400 megawatts of generating capacity to the grid. Meanwhile, nearly 100 new wind farms came online, adding 8,400 megawatts of generating capacity to the grid.³⁹

With the likelihood that few, if any, new coal-fired power plants will be approved in the United States, this de facto moratorium will send a message to the world. Denmark and New Zealand have already banned new coal-fired power plants. Other countries are likely to join this effort to cut carbon emissions. Even China, which was building one new coal plant a week, is surging ahead with harnessing renewable energy development and will soon overtake the United States in wind electric generation. These and other developments suggest that the goal of cutting carbon emissions 80 percent by 2020 may be much more attainable than many would have thought.⁴⁰

Stabilizing Climate

Earlier we outlined the need to cut net carbon dioxide emissions 80 percent by 2020 to minimize the future rise in temperature. Here we summarize the Plan B measures for doing so, including both reducing fossil fuel use and increasing biological sequestration.

After energy demand is stabilized by dramatically improving efficiency, replacing fossil fuels with renewable sources of energy for generating electricity and heat will reduce carbon emissions in 2020 by more than 3.2 billion tons. (See Table 10–1.) The biggest single cut in carbon emissions comes from phasing out the use of coal to generate electricity. Other cuts come from eliminating all the oil and 70 percent of the natural gas used to generate electricity.⁴¹

In the transport sector, the greatly reduced use of oil will eliminate 1.4 billion tons of carbon emissions. This reduction relies heavily on the shift to plug-in hybrid and all-electric cars that will run on carbon-free sources of electricity such as wind. The remainder comes largely from shifting long-haul freight from trucks to trains, electrifying freight and passenger trains, and using green electricity to power them.⁴²

Table 10–1. *Plan B Carbon Dioxide Emissions Reductions and Sequestration in 2020*

Action	Amount
	(million tons carbon)
Energy Restructuring	
Replacing fossil fuels with renewables for electricity and heat	3,210
Restructuring the transport system	1,400
Reducing coal and oil use in industry	100
Biological Carbon Sequestration	
Ending net deforestation	1,500
Planting trees to sequester carbon	860
Managing soils to sequester carbon	<u>600</u>
Total Carbon Dioxide Reductions in 2020	7,670
Carbon Dioxide Emissions in 2006	9,350
Percent Reduction from 2006 Baseline	82.0

Source: See endnote 41.

At present, net deforestation of the earth is responsible for an estimated 1.5 billion tons of carbon emissions per year. The Plan B goal is to bring deforestation to a halt by 2020, thus totally eliminating this source of carbon emissions. But we are not content with just halting deforestation. We want to increase the number of trees in order to sequester carbon. Planting trees on deforested areas and marginal lands will sequester more than 860 million tons of carbon each year. The similarly ambitious planting of trees to control flooding, reduce rainfall runoff to recharge aquifers, and protect soils from erosion will take additional carbon out of the atmosphere.⁴³

The other initiative to sequester carbon biologically is achieved through land use management. This includes expanding the area of minimum- or no-till cropland, planting more cover crops during the off-season, and using more perennials instead of annuals in cropping patterns. The latter would mean,

for example, using less corn and more switchgrass to produce fuel ethanol. These practices can sequester an estimated 600 million tons of carbon per year.⁴⁴

Together, replacing fossil fuels in electricity generation with renewable sources of energy, switching to plug-in hybrid and all-electric cars, shifting to all-electric railways, banning deforestation, and sequestering carbon by planting trees and improving soil management will drop net carbon dioxide emissions in 2020 more than 80 percent below today's levels. This reduction gives us the best chance of keeping atmospheric CO₂ concentrations from topping 400 parts per million, limiting the future rise in temperature.⁴⁵

The most efficient means of restructuring the energy economy to stabilize atmospheric CO₂ levels is a carbon tax. As noted in Chapter 4, we propose a worldwide carbon tax of \$200 per ton to be phased in at the rate of \$20 per year between 2010 and 2020.

Paid by the primary producers—the oil and coal companies—this tax would permeate the entire fossil fuel energy economy. The tax on coal would be almost double that on natural gas simply because coal has a much higher carbon content. Once a schedule for phasing in the carbon tax and reducing the tax on income is in place, the new prices can be used by all economic decisionmakers to make more intelligent decisions. In contrast to a cap-and-trade approach, in which the price of carbon fluctuates, the price of carbon with tax restructuring is predictable. For investors, this reduction in risk is invaluable.

For countries everywhere, particularly developing ones, the economic good news is that the Plan B energy economy is much more labor-intensive than the fossil-fuel-based economy it is replacing. In Germany, for example, which is a leader in the energy transition, renewable energy industries already employ more workers than the long-standing fossil fuel and nuclear industries do. In a world where expanding employment is a universal goal, this is welcome news indeed.⁴⁶

The restructuring of the energy economy outlined here will not only dramatically drop CO₂ emissions, helping to stabilize climate, it will also eliminate much of the air pollution that we know today. The idea of a pollution-free environment is difficult for us even to imagine, simply because none of us has ever

known an energy economy that was not highly polluting. Working in coal mines will be history. Black lung disease will eventually disappear. So too will “code red” alerts warning us to avoid strenuous exercise because of dangerous levels of air pollution.

And, finally, in contrast to investments in oil fields and coal mines, where depletion and abandonment are inevitable, the new energy sources are inexhaustible. While wind turbines, solar cells, and solar thermal systems will all need repair and occasional replacement, to invest in these new energy sources is to invest in energy systems that can last forever. This well will not go dry.

Three Models of Social Change

Can we change fast enough? When thinking about the enormous need for social change as we attempt to move the world economy onto a sustainable path, I find it useful to look at various models of change. Three stand out. One is the catastrophic event model, which I call the Pearl Harbor model, where a dramatic event fundamentally changes how we think and behave. The second model is one where a society reaches a tipping point on a particular issue often after an extended period of gradual change in thinking and attitudes. This I call the Berlin Wall model. The third is the sandwich model of social change, where there is a strong grassroots movement pushing for change on a particular issue that is fully supported by strong political leadership at the top.

The surprise Japanese attack on Pearl Harbor on December 7, 1941, was a dramatic wakeup call. It totally changed how Americans thought about the war. If the American people had been asked on December 6th whether the country should enter World War II, probably 95 percent would have said no. By Monday morning, December 8th, perhaps 95 percent would have said yes.

The weakness of the Pearl Harbor model is that if we have to wait for a catastrophic event to change our behavior, it might be too late. It could lead to stresses that would themselves lead to social collapse. When scientists are asked to identify a possible “Pearl Harbor” scenario on the climate front, they frequently point to the possible breakup of the West Antarctic ice sheet. Relatively small blocks of it have been breaking off for more

than a decade now, but huge parts of the sheet could break off, sliding into the ocean.

It is conceivable that this breakup could raise sea level a frightening two or three feet within a matter of years. Unfortunately, if we reach this point it may be too late to cut carbon emissions fast enough to save the remainder of the West Antarctic ice sheet or the Greenland ice sheet, whose melting is also accelerating. This is not the model we want to follow for social change on climate.

The Berlin Wall model is of interest because the wall’s dismantling in November 1989 was a visual manifestation of a much more fundamental social change. At some point, the people living in Eastern Europe, buoyed by changes in Moscow, had rejected the great “socialist experiment” with its one-party political system and centrally planned economy. Although it was not anticipated, Eastern Europe experienced a political revolution, an essentially bloodless revolution, that changed the form of government in every country in the region. It had reached a tipping point, but it was not expected. You can search the political science journals of the 1980s in vain for an article warning that Eastern Europe was on the verge of a political revolution. In Washington the Central Intelligence Agency (CIA) “had no idea in January 1989 that a tidal wave of history was about to break upon us,” reflected Robert Gates, formerly with the CIA and now U.S. Secretary of Defense, in a 1996 interview.⁴⁷

Many social changes occur when societies reach tipping points or cross key thresholds. Once that happens, change comes rapidly and often unpredictably. One of the best known U.S. tipping points is the growing opposition to smoking that took place during the last half of the twentieth century. This anti-smoking movement was fueled by a steady flow of information on the health-damaging effects of smoking, a process that began with the Surgeon General’s first report in 1964 on smoking and health. The tipping point came when this information flow finally overcame the heavily funded disinformation campaign funded by the tobacco industry.⁴⁸

Published almost every year, the Surgeon General’s report both drew attention to what was being learned about the effect of smoking on health and spawned countless new research proj-

ects on this relationship. There were times in the 1980s and 1990s when it seemed every few weeks another study was being released that had analyzed and documented one health effect or another associated with smoking. Eventually smoking was linked to more than 15 forms of cancer and to heart disease and strokes. As public awareness of the damaging effects of smoking on health accumulated, various measures were adopted that banned smoking on planes and in offices, restaurants, and other public places. As a result of these collective changes, cigarette smoking per person peaked around 1970 and began a long-term decline that continues today.⁴⁹

One of the defining events in this social shift came when the tobacco industry agreed to compensate state governments for past Medicare costs of treating smoking victims. More recently, in June 2009 Congress passed by an overwhelming margin and President Obama signed a bill that gave the Food and Drug Administration the authority to regulate tobacco products, including advertising. It opened a new chapter in the effort to reduce the health toll from smoking.⁵⁰

The sandwich model of social change is in many ways the most attractive one, partly because it brings a potential for rapid change. As of mid-2009, the strong grassroots interest in cutting carbon emissions and developing renewable sources of energy is merging with the interests of President Obama and his administration. One result, as noted earlier, is the de facto moratorium on building new coal plants.

There are many signs that the United States may be moving toward a tipping point on climate, much as it did on civil rights in the 1960s. Though some of the indicators also reflect the economic downturn, it now seems likely that carbon emissions in the United States peaked in 2007 and have begun what will be a long-term decline. The burning of coal and oil, the principal sources of carbon emissions, may both now be declining. And the automobile fleet may be shrinking. With the cars to be scrapped in 2009 likely to exceed sales, the U.S. automobile fleet may have peaked and also begun to decline.⁵¹

The shift to more fuel-efficient cars over the last two years, spurred in part by higher gasoline prices, was strongly reinforced by the new automobile fuel efficiency standards and by rescue package pressures on the automobile companies to

improve fuel efficiency. Shifts within the energy sector, with rapid growth in wind and solar energy while coal and oil are declining, also signal a basic shift in values, one that could eventually alter every sector of the economy. If so, this combined with a national leadership that shares these emerging values, could lead to social and economic change on a scale and at a pace we cannot now easily imagine.⁵²

It is quite possible that U.S. oil consumption, for example, has peaked. The combination of much more demanding automobile efficiency standards, a dramatic restoration of funding for public transit, and an encouraging shift not only to more fuel-efficient gas-electric hybrid cars but to both plug-in hybrids and electric cars could dramatically reduce gasoline sales. The U.S. Department of Energy in past years had projected substantial growth in U.S. oil consumption, but it has recently revised this downward. The question now is not will oil use decline, but how fast will it do so. Carbon emissions may also have peaked.⁵³

Of the three models of social change, relying on the Pearl Harbor model is by far the riskiest, because by the time a society-changing catastrophic event occurs, it may be too late. The Berlin Wall model works, despite the lack of government support, but it does take time. Some 40 years elapsed after the communist takeover of the governments of Eastern Europe before the spreading opposition became strong enough to overcome repressive regimes and switch to democratically elected governments. The ideal situation for rapid, historic progress occurs when mounting grassroots pressure for change merges with a national leadership committed to the same change. This may help explain why the world has such high hopes for the new U.S. leadership as it faces the challenges described in earlier chapters.

A Wartime Mobilization

The U.S. entry into World War II offers an inspiring case study in rapid mobilization. Mobilizing to save civilization both parallels and contrasts with this earlier mobilization. For the war, the United States underwent a massive economic restructuring, but it was only intended to be temporary. Mobilizing to save civilization, in contrast, requires an economic restructuring that will endure.

Initially, the United States resisted involvement in the war and responded only after it was directly attacked at Pearl Harbor on December 7, 1941. But respond it did. After an all-out commitment, the U.S. engagement helped turn the tide of war, leading the Allied Forces to victory within three-and-a-half years.⁵⁴

In his State of the Union address on January 6, 1942, one month after the bombing of Pearl Harbor, President Franklin D. Roosevelt announced the country's arms production goals. The United States, he said, was planning to produce 45,000 tanks, 60,000 planes, 20,000 anti-aircraft guns, and several thousand ships. He added, "Let no man say it cannot be done."⁵⁵

No one had ever seen such huge arms production numbers. Public skepticism was widespread. But Roosevelt and his colleagues realized that the world's largest concentration of industrial power at that time was in the U.S. automobile industry. Even during the Depression, the United States was producing 3 million or more cars a year. After his State of the Union address, Roosevelt met with auto industry leaders and told them that the country would rely heavily on them to reach these arms production goals. Initially they wanted to continue making cars and simply add on the production of armaments. What they did not yet know was that the sale of new cars would soon be banned. From early February 1942 through the end of 1944, nearly three years, essentially no cars were produced in the United States.⁵⁶

In addition to a ban on the production and sale of cars for private use, residential and highway construction was halted, and driving for pleasure was banned. Strategic goods—including tires, gasoline, fuel oil, and sugar—were rationed beginning in 1942. Cutting back on private consumption of these goods freed up material resources that were vital to the war effort.⁵⁷

The year 1942 witnessed the greatest expansion of industrial output in the nation's history—all for military use. Wartime aircraft needs were enormous. They included not only fighters, bombers, and reconnaissance planes, but also the troop and cargo transports needed to fight a war on distant fronts. From the beginning of 1942 through 1944, the United States far exceeded the initial goal of 60,000 planes, turning out a staggering 229,600 aircraft, a fleet so vast it is hard today to even

visualize it. Equally impressive, by the end of the war more than 5,000 ships were added to the 1,000 or so that made up the American Merchant Fleet in 1939.⁵⁸

In her book *No Ordinary Time*, Doris Kearns Goodwin describes how various firms converted. A sparkplug factory was among the first to switch to the production of machine guns. Soon a manufacturer of stoves was producing lifeboats. A merry-go-round factory was making gun mounts; a toy company was turning out compasses; a corset manufacturer was producing grenade belts; and a pinball machine plant began to make armor-piercing shells.⁵⁹

In retrospect, the speed of this conversion from a peacetime to a wartime economy is stunning. The harnessing of U.S. industrial power tipped the scales decisively toward the Allied Forces, reversing the tide of war. Germany and Japan, already fully extended, could not counter this effort. British Prime Minister Winston Churchill often quoted his foreign secretary, Sir Edward Grey: "The United States is like a giant boiler. Once the fire is lighted under it, there is no limit to the power it can generate."⁶⁰

This mobilization of resources within a matter of months demonstrates that a country and, indeed, the world can restructure the economy quickly if convinced of the need to do so. Many people—although not yet the majority—are already convinced of the need for a wholesale economic restructuring. The purpose of this book is to convince more people of this need, helping to tip the balance toward the forces of change and hope.

Mobilizing to Save Civilization

Mobilizing to save civilization means fundamentally restructuring the global economy in order to stabilize climate, eradicate poverty, stabilize population, restore the economy's natural support systems, and, above all, restore hope. We have the technologies, economic instruments, and financial resources to do this. The United States, the wealthiest society that has ever existed, has the resources to lead this effort.

On the eradication of poverty, Jeffrey Sachs of Columbia University's Earth Institute sums it up well: "The tragic irony of this moment is that the rich countries are so rich and the poor so poor that a few added tenths of one percent of GNP from the

rich ones ramped up over the coming decades could do what was never before possible in human history: ensure that the basic needs of health and education are met for all impoverished children in this world.”⁶¹

We can calculate roughly the costs of the changes needed to move our twenty-first century civilization off the decline-and-collapse path and onto a path that will sustain civilization. What we cannot calculate is the cost of *not* adopting Plan B. How do you put a price tag on civilizational collapse and the massive suffering and death that typically accompanies it?

As noted in Chapter 7, the additional external funding needed to achieve universal primary education in developing countries that require help, for instance, is conservatively estimated at \$10 billion per year. Funding for adult literacy programs based largely on volunteers will take an estimated additional \$4 billion annually. Providing for the most basic health care in developing countries is estimated at \$33 billion by the World Health Organization. The additional funding needed to provide reproductive health care and family planning services to all women in developing countries amounts to \$17 billion a year.⁶²

Closing the condom gap by providing the additional 14.7 billion condoms needed each year to control the spread of HIV in the developing world and Eastern Europe requires roughly \$3 billion—\$440 million for condoms and \$2.2 billion for AIDS prevention education and condom distribution. The cost of extending school lunch programs to the 44 poorest countries is \$6 billion. An estimated \$4 billion per year would cover the cost of assistance to preschool children and pregnant women in these countries. Altogether, the cost of reaching basic social goals comes to \$77 billion a year.⁶³

As noted in Chapter 8, a poverty eradication effort that is not accompanied by an earth restoration effort is doomed to fail. Protecting topsoil, reforesting the earth, restoring oceanic fisheries, and other needed measures will cost an estimated \$110 billion in additional expenditures per year. The most costly activities, protecting biological diversity at \$31 billion and conserving soil on cropland at \$24 billion, account for almost half of the earth restoration annual outlay.⁶⁴

Combining social goals and earth restoration components into a Plan B budget yields an additional annual expenditure of

\$187 billion, roughly one third of the current U.S. military budget or 13 percent of the global military budget. (See Tables 10–2 and 10–3.) In a sense this is the new defense budget, the one that addresses the most serious threats to our security.⁶⁵

Unfortunately, the United States continues to focus on building an ever-stronger military, largely ignoring the threats posed by continuing environmental deterioration, poverty, and population growth. Its 2008 military expenditures totaled \$607 bil-

Table 10–2. *Plan B Budget: Additional Annual Expenditures Needed to Meet Social Goals and to Restore the Earth*

Goal	Funding (billion dollars)
Basic Social Goals	
Universal primary education	10
Eradication of adult illiteracy	4
School lunch programs for 44 poorest countries	6
Assistance to preschool children and pregnant women in 44 poorest countries	4
Reproductive health and family planning	17
Universal basic health care	33
Closing the condom gap	<u>3</u>
Total	77
Earth Restoration Goals	
Planting trees to reduce flooding and conserve soil	6
Planting trees to sequester carbon	17
Protecting topsoil on cropland	24
Restoring rangelands	9
Restoring fisheries	13
Protecting biological diversity	31
Stabilizing water tables	<u>10</u>
Total	110
Grand Total	187

Source: See endnotes 63 and 64.

Table 10–3. *Military Budgets by Country and for the World in 2008 and Plan B Budget*

Country	Budget (billion dollars)
United States	607
China	85
France	66
United Kingdom	65
Russia	59
Germany	47
Japan	46
Italy	41
Saudi Arabia	38
India	30
All other	<u>380</u>
World Military Expenditure	1,464
Plan B Budget	187

Source: See endnote 65.

lion, 41 percent of the global total of \$1,464 billion. Other leading spenders included China (\$85 billion), France (\$66 billion), the United Kingdom (\$65 billion), and Russia (\$59 billion).⁶⁶

As of mid-2009, direct U.S. appropriations for the Iraq war, which has lasted longer than World War II, total some \$642 billion. Economists Joseph Stiglitz and Linda Bilmes calculate that if all the costs are included, such as the lifetime of care required for returning troops who are brain-injured or psychologically shattered, the cost of war will in the end approach \$3 trillion. Yet the Iraq war may prove to be one of history's most costly mistakes not so much because of fiscal outlay but because it has diverted the world's attention from climate change and the other threats to civilization itself.⁶⁷

It is decision time. Like earlier civilizations that got into environmental trouble, we can decide to stay with business as usual and watch our modern economy decline and eventually

collapse, or we can consciously move onto a new path, one that will sustain economic progress. In this situation, the failure to act is a de facto decision to stay on the decline-and-collapse path.

No one can argue today that we do not have the resources to do the job. We can stabilize world population. We can get rid of hunger, illiteracy, disease, and poverty, and we can restore the earth's soils, forests, and fisheries. Shifting 13 percent of the world military budget to the Plan B budget would be more than adequate to move the world onto a path that would sustain progress. We can build a global community where the basic needs of all people are satisfied—a world that will allow us to think of ourselves as civilized.

This economic restructuring depends on tax restructuring, on getting the market to be ecologically honest, as described earlier. The benchmark of political leadership will be whether leaders succeed in shifting taxes from work to environmentally destructive activities. It is tax shifting, not additional appropriations, that is the key to restructuring the energy economy in order to stabilize climate.

It is easy to spend hundreds of billions in response to terrorist threats, but the reality is that the resources needed to disrupt a modern economy are small, and a U.S. Department of Homeland Security, however heavily funded, provides only minimal protection from suicidal terrorists. The challenge is not to provide a high-tech military response to terrorism but to build a global society that is environmentally sustainable and equitable—one that restores hope for everyone. Such an effort would do more to combat terrorism than any increase in military expenditures or any new weapons systems, however advanced.

Just as the forces of decline can reinforce each other, so can the forces of progress. For example, efficiency gains that lower oil dependence also reduce carbon emissions and air pollution. Steps to eradicate poverty help stabilize population. Reforestation sequesters carbon, increases aquifer recharge, and reduces soil erosion. Once we get enough trends headed in the right direction, they will reinforce each other.

The world needs a major success story in reducing carbon emissions and dependence on oil in order to bolster hope in the

future. If the United States, for instance, were to launch a crash program to shift to plug-in and all-electric hybrid cars while simultaneously investing in thousands of wind farms, Americans could do most of their driving with wind energy, dramatically reducing the need for oil.

With many U.S. automobile assembly lines currently idled, it would be a relatively simple matter to retool some of them to produce wind turbines, enabling the country to quickly harness its vast wind energy potential. This would be a rather modest initiative compared with the restructuring during World War II, but it would help the world to see that restructuring an economy is achievable and that it can be done quickly, profitably, and in a way that enhances national security both by reducing dependence on vulnerable oil supplies and by avoiding disruptive climate change.

What You and I Can Do

One of the questions I hear most frequently is, What can I do? People often expect me to talk about lifestyle changes, recycling newspapers, or changing light bulbs. These are essential, but they are not nearly enough. We now need to restructure the global economy, and quickly. It means becoming politically active, working for the needed changes. Saving civilization is not a spectator sport.

Inform yourself, read about the issues. If you want to know what happened to earlier civilizations that found themselves in environmental trouble, read *Collapse* by Jared Diamond or *A Short History of Progress* by Ronald Wright or *The Collapse of Complex Societies* by Joseph Tainter. If you found this book useful in helping you think about what to do, share it with others. It can be downloaded free of charge from the Institute's Web site, earthpolicy.org.⁶⁸

Pick an issue that's meaningful to you, such as tax restructuring, banning inefficient light bulbs, phasing out coal-fired power plants, or working for streets in your community that are pedestrian- and bicycle-friendly, or join a group that is working to stabilize world population. What could be more exciting and rewarding than getting personally involved in trying to save civilization?

You may want to proceed on your own, but you might also

want to organize a group of like-minded individuals. You might begin by talking with others to help select an issue or issues to work on.

And communicate with your elected representatives on the city council or the national legislature. Aside from the particular issue that you choose to work on, there are two overriding policy challenges: restructuring taxes and reordering fiscal priorities. Write or e-mail your elected representative about the need to restructure taxes by reducing income taxes and raising environmental taxes. Remind him or her that leaving costs off the books may offer a Ponzi sense of prosperity in the short run but that it leads to collapse in the long run.

Let your political representatives know that a world spending more than \$1 trillion a year for military purposes is simply out of sync with reality, not responding to the most serious threats to our future. Ask them if \$187 billion a year, the Plan B budget, is an unreasonable expenditure to save civilization. Ask them if diverting one eighth of the global military budget to saving civilization is too costly. Remind them of how the United States mobilized during World War II.⁶⁹

And above all, don't underestimate what you can do. Anthropologist Margaret Mead once said, "Never doubt that a small group of concerned citizens can change the world. Indeed, it is the only thing that ever has."⁷⁰

In addition, it doesn't hurt to underpin your political efforts with lifestyle changes. But remember they supplement your political action; they are not a substitute for it. Urban planner Richard Register recounts meeting a bicycle activist friend wearing a t-shirt that said "I just lost 3,500 pounds. Ask me how." When queried he said he had sold his car. Replacing a 3,500-pound car with a 22-pound bicycle obviously reduces energy use dramatically, but it also reduces materials use by 99 percent, indirectly saving still more energy.⁷¹

Dietary changes can also make a difference. We learned that the climate footprint differences between a diet rich in red meat and a plant-based diet is roughly the same as the climate footprint difference between driving a large fuel-guzzling SUV and a highly efficient gas-electric hybrid. Those of us with diets heavy in fat-rich livestock products can do both ourselves and civilization a favor by moving down the food chain.⁷²

Beyond these rather painless often healthily beneficial lifestyle changes, we can also think about sacrifice. During World War II the military draft asked millions of young men to risk the ultimate sacrifice. But we do not need to sacrifice lives as we battle to save civilization. We are called on only to be politically active and to make lifestyle changes. During the early part of World War II President Roosevelt frequently asked Americans to adjust their lifestyles. What contributions can we make today, in time, money, or reduced consumption, to help save civilization?

The choice is ours—yours and mine. We can stay with business as usual and preside over an economy that continues to destroy its natural support systems until it destroys itself, or we can adopt Plan B and be the generation that changes direction, moving the world onto a path of sustained progress. The choice will be made by our generation, but it will affect life on earth for all generations to come.