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The End of the Car Culture and the Reemergence of Public Transportation

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Abstract : The United States, which has been the poster child for car culture, has been warned of the unparalleled prospect of trillion-dollar deficits for years to come. Most state governments face severe reduction in tax monies, which will mean fewer funds for road and bridge repair, as well as reductions in other services. Personal debt is very high and home values have declined sharply, reducing the "nest egg" of many families for retirement. In addition, the stock market decline has had deleterious effects on retirement funds. The car culture was built on cheap fuel, financing of car purchases, and a convenient national system of mostly free roads connecting nearly all parts of the United States. Personal transportation with cars has been the norm. Petroleum prices are down dramatically at the end of 2008, but people are driving less to pay off personal debt or because they have lost their jobs. Electric cars seemed promising until problems with coal-generated electricity became more generally known. In short, the car culture has passed a tipping point and alternative public transportation is not adequate for probable future needs. One characteristic of passing a tipping point is that return to the pre-tipping point conditions is very unlikely.

Key words : Car culture, Public transportation, Climate change, Financial crisis, Coal problems, Personal/ financial debt.

Turning and turning in the widening gyre

The falcon cannot hear the falconer;

Things fall apart; the center cannot hold. **William Butler Yeats**

We've made too many promises and asked for too few sacrifices. We're going to have to change our culture as we know it.

Governor David A. Paterson (New York)

Economics must be seen as a small sub-branch of ecology.**Gary Snyder**

A recent television program in the United States showed pictures of three huge car dealerships near the Port of Los Angeles in Southern California. In one dealership, trunk lids were open for a very few cars – indicating the ones that had been sold and were to be removed from the car lot. These brief visual images had a delayed but powerful impact. Americans are still searching for automobiles that run efficiently on less gas and for debt financing at low rates. Even if both these wishes are met, most families still are attempting to reduce debt in these depressing economic times. Lakoff (2008) asserts that human society is trying to understand the 21st century with an 18th-century brain.

A Future of Declines

Most families in the 1920s did not have a car or telephone. The Great Depression started in 1929 and was worldwide. In the United States, the depression began to end during World War II, but real affluence did not begin until the post-war period. The United States

and some other countries have enjoyed approximately six decades of affluence, but about half the world's population has never come close to the affluence many people in the United States took for granted.

However, President Obama is courageously bracing Americans for the prospect of "trillion-dollar deficits for years to come," a stark assessment of the budgetary outlook that would force his administration to impose tightened fiscal discipline on the government (Zeleny and Andrews, 2009). Heinberg (2007) has attempted to prepare readers for a century of declines – on an overcrowded planet, resources will be used more rapidly than they can be regenerated. Coal, once the fossil fuel of choice, has had a recent setback due to a Tennessee coal ash pond that ruptured and sent a billion gallons of toxic sludge across 300 acres in East Tennessee (Dewan, 2009). Most of these dumps contain heavy metals, such as mercury, lead, arsenic, and selenium. Electric powered cars will lose appeal if concern about fly ash pond spills persists. The world has passed one climate tipping point (at about 350 ppm atmospheric carbon dioxide) and later a financial tipping point in 2008. Humankind needs to avoid a transportation tipping point as well.

In addition to financial debt, human consumers have an enormous ecological debt (termed *ecological overshoot*), which is more serious than the unsuccessful economic system and the chaos it has caused. The human economy is a wholly owned subsidiary of natural capital, which is the basis for all other forms of capital. The ecosystem services provided by natural capital could also be described as the biospheric life support system, which has maintained conditions favorable to the genus *Homo* for approximately two million years. If the functions of the biospheric life support system change appreciably due to anthropogenic activities, conditions may no longer favor the genus *Homo*.

Bartlett (2008) states: "If any fraction of the observed global warming can be attributed to the actions of humans, then this, by itself, constitutes clear and compelling evidence that the human population, living as we do, has exceeded the Carrying Capacity of the Earth, a situation that is clearly not sustainable." In addition, Paul and Anne Ehrlich (2008) make an extremely important point regarding human population: "Few people perhaps realize that large-scale famines may result from climate change-induced crop failures. Crops are dependent not only on appropriate temperatures, but also on precise patterns of rainfall, and both are changing. Farmers will have a hard time moving to new areas when local conditions become unsatisfactory, because they must find not only the right climate, but suitable soils and day-lengths (many crops require the right photoperiod to flower and produce seeds or fruit)." Stated bluntly, humankind is risking its food supply by using fossil fuels to prolong the car culture era. Humans must cease using fossil fuels, especially coal, to maintain a high energy lifestyle, of which personal cars are a major part.

Although globalization can be viewed as a race to an economic "bottom," hope still glimmers. Plans are in place (not yet implemented) in some areas for more environmentally friendly, energy efficient networks of high-capacity rail corridors (e.g., Virginia Rail Solutions, 2008). Scientists are trying to spread the word that human-generated carbon dioxide, and the warming it brings, will linger far into the future – unless humankind takes heroic measures to pull the gas out of the air (Nature Reports Climate Change, 2008; Archer, 2009). If measures of this kind do not encourage humankind to engage in more long-range planning and thinking, what will?

Transition to Carbon-Free Alternatives

The current decline (December 2008) in the price of oil should not adversely affect the speed with which the transition to carbon-free alternative sources of energy occurs. Economic chaos is widening and spreading to developing nations, despite efforts to rescue banks and other institutions (Krugman, 2008a). When the economy is down globally, protecting the planet's biospheric life support system is not usually given a high priority (e.g., Mufson, 2008), despite its central role in the survival of the human species and its economic system.

Total Decarbonization

Monbiot (2008) reports: "A paper by the Tyndall Centre for Climate Change Research shows that if we are to give ourselves a roughly even chance of preventing more than two degrees of warming, global emissions from energy must peak by 2015 and decline by between six and eight per cent per year from 2020 to 2040, leading to a complete decarbonisation of the global economy soon after 2050." Anyone who has read the volume *Six Degrees* (Lynas, 2008) would certainly not wish to take the risk of a 2°C rise and would realize that even the possibility of temperature increases over 2°C is unthinkable. An "even chance" of preventing more than a 2°C temperature increase is not even remotely attractive. Monbiot (2006, p. 65) provides an illustration from England of the fierce resistance likely to be encountered in any alteration of "business as usual": "When the Minister for Housing and Planning, Yvette Cooper, was urged to introduce proper energy efficiency standards for the refurbishment of houses, she said that it would amount to 'unnecessary gold plating.'"

The major alteration of lifestyle for the comparative affluent half of the global human population will be formidable. Monbiot (2008) quotes Sharon Astrok: ". . . replacing the world's energy infrastructure involves 'an enormous front-load of fossil fuels,' which are required to manufacture wind turbines, electric cars, new grid connections, insulation and all the rest. This could push us past the climate tipping point. Instead, she proposes, we must ask people 'to make short term, radical sacrifices,' cutting our energy consumption by 50%, with little technological assistance, in five years." Unfortunately, voluntary sacrifice, either at the personal or corporate level, simply does not work.

End of an Era

What reaction did buggy whip manufacturers have when cars replaced horses as transportation? Did they view themselves as buggy whip manufacturers or did they think they were in the transportation business? If the former, they were doomed. If the latter, they were still viable.

Felsenthal (2008) notes that "a panel of experts formally declared the U.S. economy in recession since December 2007." If a "light at the end of the tunnel" exists, it is still fairly dim. Despite the seriousness of the beginning of the end of the car culture, it is getting far more attention than three other massive global problems. In my opinion, these are (1) a global climate change, (2) overpopulation (population exceeds carrying capacity), (3) ecological overshoot.

Suppression and Distortion of Science

Arguably, the core problem in both the rapidly worsening climate and food crises is the suppression and distortion of science. Of course, the "war" between science and religion has ancient roots because of the belief that science undermines certain articles of faith. Judson (2008) notes that "science is often taught as a body of knowledge – a set of facts and equations." She notes, in this regard: "Science itself is something else, something both more profound and less tangible. It is an

attitude, a stance towards measuring, evaluating and describing the world that is based on skepticism, investigation and evidence. The hallmark is curiosity; the aim, to see the world as it is. . . . Moreover, to downplay evidence that doesn't fit your ideas, and to place more weight on evidence that does – this is something that human brains just seem to do" (Judson 2008).

Although scientists are well aware of the suppression and distortion of science by well-funded special interest groups and lobbyists, the general public in the United States and many other countries is not. This lack of recognition is partly the fault of the news media, which often publishes or airs anti-science commentaries and articles without carefully checking the qualifications of the source. If people hear the same lie repeatedly, that lie is often accepted as fact. Some newspapers (e.g., *The Guardian*) regularly have op-ed pieces (e.g., by George Monbiot) that identify misrepresentations of science and that are often accompanied by numerous references, including peer-reviewed scientific journals. Increasingly, the Internet is a means of providing evidence based on scientific information. Even though the Internet may lack quality control, so does the news media. A recent example is the advertising about "clean coal." Some television advertisements give the impression that clean coal is a presently available, economical, and functional technology being installed in new, coal burning, electric power generating plants. Former US Vice-President Al Gore is leading an effort to alert the general public to the fact that, although clean coal "could theoretically exist . . . the only demonstration plant was cancelled" (B. Johnson, 2008). Clean coal "does not exist anywhere in the world today at commercial scale, though plenty of companies are fiddling with small-scale projects to develop the technology" (K. Johnson, 2008).

Saving the Planet and Humankind from the Car Culture

Greenhouse gas emissions, much from transportation, are still on the rise and the greenhouse gas positive feedback loops are increasing markedly in importance. Avoiding a new major global climate tipping point is increasingly unlikely. To further complicate the situation, the three remaining major US auto makers (General Motors, Chrysler, and Ford) are in critical, probably fatal, financial trouble unless they are rescued by the US government.

Arguably, the United States is the poster child for the global car culture. In December 2008, regular, unleaded gasoline was just under US$2 per gallon, due to the recession and reduced personal driving. However, earlier in the year, the same grade of gasoline was over US$4 per gallon, and people were complaining bitterly about the high price. During the 2008 election campaign in the United States, one political party kept intoning "Drill, Baby, Drill" as if unlimited amounts of offshore oil were just waiting to be found. Fortunately, although many citizens were longing for a return to a cheap, abundant energy lifestyle, common sense ultimately prevailed, but not by a substantial margin.

However, cheap gas has returned due to a fairly severe recession, but this respite is clearly temporary and will end if a booming economy is reestablished. The US government is, in late December 2008, in the process of bailing out car manufacturers Chevrolet and Chrysler (Ford did not request financial aid at this time) with the hope that more fuel efficient cars will be produced. People still will not accept that the era of personal transportation in large, comfortable vehicles is ending. Larger concerns, such as the effect of rapid climate change on agricultural food production, seem not to be a major factor in the lifestyle of most citizens (e.g., Oregon State University, 2008).

The Threat of Runaway Climate Change

The probability of runaway climate change increases relentlessly while "business as usual" continues. The end of cheap, abundant petroleum also signaled the beginning of the end of the car culture. In a very real sense, humankind is unwillingly in the midst of an energy revolution. However, in the United States, and likely many other countries, a feeling exists that no individual, or even corporations, should suffer during a revolution. However, in any revolution, people and corporations will inevitably be hurt because their "fitness" is not adequate for this new energy world. Other more competitive individuals or corporations with higher "fitness" will survive, at least until the next revolution. Humankind can put low "fitness" individuals on life support (i.e., subsidies), but this approach probably will not work. Survival depends upon "fitness" that evolved and developed while the crisis was gaining momentum.

Science and Fitness

Much of humankind's "fitness" to survive in a rapidly changing world depends on science, robust evidence, and reliable information and intelligence about the events and changes in and on the planet it calls home (Union of Concerned Scientists, 2008). Shulman (2008, p. x) notes: ". . . the Bush administration took the nation to war based upon flawed and trumped-up evidence about the purported existence in Iraq of weapons of mass destruction and about Saddam Hussein's purported connections with the Al Qaeda terrorist network." This action was an important decision because it diverted resources from a variety of projects ranging from health care to reduction of anthropogenic greenhouse gas emissions. American citizens will pay a huge, long-term price for this reduction in fitness.

"National security presents special issues for the federal government's handling of scientific and technical information, as well as basic intelligence gathering. Without reliable factual data and impartial analysis, government officials are in danger of misidentifying and misinterpreting threats to the nation" (Shulman 2008, p. 94). Shulman (2008, p. 10) lists seven ways in which politicians suppress freedom of scientific inquiry.

(1) They limit what questions scientists and other government staff are allowed to ask.

(2) They place constraints on what methods can be used to seek answers.

(3) They restrict the selection of who is permitted to ask questions, seek answers, or give advice in government agencies.

(4) They suppress findings solely on the basis that they conflict with administration policies.

(5) They sanction misleading and unjustified claims to bolster results that are "approved of" by the administration.

(6) They routinely place ideologically rigid nonscientist supervisors in charge of government scientific research programs.

(7) They have a chilling effect on the scientific community by exacting retribution, including dismissals, against scientists who ask unapproved questions or produce unapproved-of results.

Most laypersons fail to realize what a fragile, complex system the scientific process represents. Scientists must exchange information freely and never hesitate to question all "facts." Scientists work best when

they formulate questions free from ideological bias. All the major problems faced by humankind (e.g., climate change, overpopulation, ecological overshoot, ubiquitous toxics, food production, potable water, and energy) will be resolved only if information produced by the scientific process is readily available. Nations where science has not been nurtured will not be able to cope well with the formidable challenges they face. Most scientists already have heavy work loads by choice. Diverting a substantial portion of their energy to defending the scientific process from political ideologies is suicidal. The politicians who have carried out a war on science are far from blameless, but this situation should be tempered by the realization that most people have a propensity for deceit. Angier (2008) reports: "Much evidence suggests that we humans, with our densely corrugated neocortex, lie to one another chronically and with aplumb." Other primates are deceivers also (apes, chimpanzees, monkeys), so the evolutionary history is long.

Car Culture Infrastructure

Despite the precipitous drop in gasoline prices in the United States in late 2008, a precipitous drop in total miles driven has also occurred. One common explanation is a massive reduction in household spending to reduce debt. A massive infrastructure (a vast network of roads, parking lots, junkyards, gasoline stations, etc. [Kay, 1997]) permits rapid personal car transit (as well as many trucks) throughout the contiguous United States.

However, in an economic downturn, federal and state funds are not available for all kinds of societal needs, such as education, road maintenance, and sewage and water plants. Steinhauer (2008) notes that "California . . . has suspended nearly $4 billion in public works projects . . . because of capsizing budgets, an inability to attract investors to the municipal bonds used to bankroll many projects and a reduction in gasoline tax revenues – which underline a lot of transportation financing. The American Association of State Highway and Transportation Officials has identified 5,000 transportation projects nationwide that lack the dollars to proceed; many of them, like the $730 million project here to add 10 miles of high-occupancy-vehicle lanes to the 405 Freeway . . . have been stopped midstream."

Requirements of a Car Culture

In the United States, the car culture developed rapidly in the 20th century because of four factors: (1) a moderately inexpensive mass produced car (e.g., Henry Ford), (2) cheap, abundant gasoline, (3) a rapidly developing highway system (especially after World War II), mostly toll free, that facilitated individual or family trips to places previously not readily accessible, (4) financing that made purchase of a major item, such as a car, easy for low and middle income families.

Many consequences also occurred.

(1) Public transportation declined because personal transportation was affordable and more convenient.

(2) Ordinary citizens could now afford to have a dwelling quite distant from their workplace.

(3) Service stations (fuel and car repair) developed on all the major highway systems.

(4) Peer pressure encouraged people to have personal cars.

The current period is one of trying economic times globally. ". . . initial requests for jobless benefits [in the United States] rose to a seasonally adjusted 586,000 in the week ending December 20, 2008" (Rugaber, 2008). Ironically, the financial meltdown caused gasoline prices to go from US$2 per gallon to over US$4 per gallon and then back to US$1.66 in a single year (Nelder, 2008). In the United

States, citizens are now saving money after getting deeply in debt over the years. Generally, when the future looks good, people are willing to take on debt, but, in difficult financial times, people tend to reduce debt and buy less.

However, when a company is failing, it may fire (i.e., discharge) some percentage of the workforce instead of reducing staff salaries. Meyer (2008) quotes the December 17 *New York Times*: "Businesses routinely lay off 10 percent of their workers to cut costs. They almost never cut pay by 10 percent across the board. Traditional economic theory doesn't do a good job of explaining this." My problem with traditional economics is that the biospheric life support system is not properly valued. Without a life support system that produces conditions favorable to humans, the financial economy would not exist. For two million years, the climate has favored the genus *Homo* of which *Homo sapiens* is a part.

Personal and National Debt

For many, arguably most, Americans, their home is their primary accumulation of wealth. When US housing prices plummeted, many homeowners found that their home mortgage exceeded the value of their house. At the same time, many were faced with major losses in their savings for retirement. A significant number even lost their jobs. Many were also burdened with large credit card debt at high interest rates. Levitt and Dubner (2005, p. 151) remark: "But fear best thrives in the present tense. That is why experts rely on it; in a world that is increasingly impatient with long-term processes, fear is a potent short-term play." Fear of losing short-term security, real or delusional, and the car culture lifestyle drives humans into attempts to save these instead of developing a low energy lifestyle with greatly improved public transportation. Clearly, job creation will be important in 2009. However, should the jobs be devoted to maintaining the car culture or in improved public transportation and alternative, non-carbon sources of energy? Kunstler (2008) advocates not bailing out the system that gave humankind sport utility vehicles and strip shopping malls. He further notes: "All the activities based on getting something for nothing are dead or dying now, in particular, buying houses and cars on credit, and so it should not be a surprise that the two major victims are the housing and car industries" (Kunstler, 2008).

At present, a major battle looms in the US national capital city between environment groups, such as Friends of the Earth (2008), who advocate "green job" creation such as grids for wind and solar power, and those who advocate "what President -Elect Obama calls 'shovel-ready projects,' such as highway and bridge construction" (Kane and Shear, 2008). In a very real sense, this battle is a choice between two worlds – moving steadily toward independence from fossil fuels and foreign oil or maintaining the present US lifestyle for as long as possible, regardless of long-term, deleterious effects. Determining the outcome is difficult, but both at once is not out of the question.

Finally, the US government is deeply in debt. Landler (2008) quotes Niall Ferguson: "Usually it's the rich country lending to the poor. This time, it's the poor country lending to the rich." He summarizes the issue succinctly with a quote from economist Ben S. Bernanke: "The problem . . . was not that Americans spend too much, but that foreigners save too much. The Chinese have piled up so much excess savings that they lend money to the United States at low rates, underwriting American consumption" (Landler, 2008).

Living Simultaneously in Two Different Worlds

Taleb (2004, p. x) remarks on two separate areas that influenced his perception

of the world: "(a) the mechanisms by which our brain sees the world as less, far less, random than it actually is, and (b) the "fat tails," that wild brand of uncertainty that causes large deviations (rare events explain more and more of the world we live in, but at the same time remain as counterintuitive to us as they were to our ancestors)." He further notes: "Mother Nature does not tell you how many holes there are on the roulette table, nor does she deliver problems in a textbook way (in the real world one has to guess the problem more than the solution)" (Taleb, 2004, p. xii).

Tipping Points

Since the precise location of tipping points is unknown until they have been crossed, their occurrence appears random. For example, the role of tipping points in global climate change can be identified to some degree from past climatic changes. However, the system is so complex and multivariate that the timing of the next such event involves much uncertainty. Pearce (2007, p. xix) states: ". . . while skeptics about climate change have a valid point when they say that scientists' climate predictions are less certain than is often claimed, those skeptics are dreadfully wrong to take comfort in this. I take no comfort at all. There is chaos out there, and we should be afraid."

What do climate tipping points have to do with the car culture? Keeping personal transportation available for the wealthy part of humankind is driving exploration for carbon-based fuels that produce greenhouse gases in deadly amounts and is counterproductive in the long term. Humankind should be more rapidly developing non-carbon forms of alternative energy. In addition, humankind should rapidly increase availability of public transportation, which uses all forms of energy more efficiently than personal vehicles (except, of course, bicycles and walking). Anyone who has visited countries with good public transportation realizes what a blessing it is. It uses carbon-based fuel more efficiently than personal transportation and is amenable to non-carbon energy sources.

Conclusions

Humankind is already witnessing the end of the car culture (one rider/one vehicle) as it now exists, but humankind is not yet witnessing an adequate redevelopment of public transportation. A concomitant development is sorely needed for transmission lines for wind, solar, and geothermal power. Until this advance is accomplished, humankind is in constant danger of rapid and violent climate change.

One, possibly two, sudden, violent climate crises may be needed to develop a new energy policy in the United States and, very likely, some other countries as well (e.g., China). Inglis and Laffer (2008) remark: "A climate-change bill withered in Congress this summer because families don't need an enormous, and hidden, tax increase. . . . Conservatives do not have to agree that humans are causing climate change to recognize a sensible energy solution. All we need to assume is that burning less fossil fuel would be a good thing. . . . Yet the costs of reducing carbon emissions are not trivial. Climate change may be a serious problem, but a higher overall tax rate would devastate the long-term growth of America and the world." Only when widespread recognition occurs that the human economy is wholly dependent upon the biospheric life support system will effective control of greenhouse gases be achieved.

Another major issue is that coal is making a comeback as a home heating fuel (Zeller and Milkowski, 2008): "Problematic in some ways and difficult to handle, coal is nonetheless a cheap, plentiful, mined-in-America source of heat."

However, the political and public reaction to the massive fly ash pond spill (from coal-fueled power plants) in Tennessee will determine how vigorously alternative energy

sources are developed (e.g., Dewan, 2008). Another important reaction is the one to the reversal of a federal appeals court in Washington, DC, which temporarily reinstated a Bush administration plan to reduce pollution from coal-fired power plants (Barringer, 2008): "Tuesday's decision, by the Court of Appeals for the District of Columbia Circuit, means that levels of smog-forming nitrogen oxide must be reduced in 28 eastern states and the District of Columbia beginning Jan. 1. Levels of sulfur dioxide, closely associated with the formation of deadly fine soot particles, must be reduced beginning a year later." This plan will increase the cost of using coal for energy, making alternative sources of energy, which have decreasing costs, more attractive.

Friedman (2008) makes a good point on fossil energy costs: "How many times do we have to see this play before we admit it always ends the same way? Which play? The one where gasoline prices go up, pressures rise for more fuel-efficient cars, then gasoline prices fall and the pressure for low-mileage vehicles vanishes, consumers stop buying those cars, the oil producers celebrate, we remain addicted to oil and prices gradually go up again, petro-dictators get rich, we lose. I've already seen this play three times in my life. Trust me: It always ends the same way – badly."

The US federal government will almost certainly not try to balance the budget during the present economic crisis – but "50 . . . state governors are slashing spending in a time of recession, often at the expense both of their most vulnerable constituents and of the nation's economic future" (e.g., Krugman, 2008b). Some states are required by law to avoid budget deficits. Why are they doing this? State and local government revenues are plunging along with the economy – and unlike the federal government, lower-level governments cannot borrow their way through the crisis. So, massive development of alternative, non-carbon energy sources is unlikely in the next decade, although the US government might initiate development of alternative energy sources as part of its economic stimulus program.

Scientists will not be able to forecast the global climate precisely in this century or perhaps never. This deficiency also applies, at present, to feedback loops. "Modern climate models also predict that the relative humidity will not change much with global warming. If the real atmosphere turns out to get wetter with rising CO_2 than models predict, for example, the real water vapor feedback would be stronger than we expect" (Archer, 2009, p. 24). All positive feedback loops are amplifiers of global heating.

Humans are quite understandably addicted to personal transportation, as evidenced by major efforts to maintain the car culture. A major catastrophic event may be needed to get those enjoying personal transportation to change their lifestyle. However, "business as usual" threatens much of the life on Earth, including humans (e.g., Diamond, 2004; Gore, 2008).

All complex systems appear to have tipping points involving sudden, often violent, irreversible change. Evidence for this situation is available for both social (humans) and ecological systems. However, an appalling disparity exists between the rate of global climate change and the reduction of anthropogenic greenhouse gas emissions. For years, humankind has been hearing that climate change is occurring much more rapidly than expected. Hans Joachim Schellnhuber, the scientist who heads the Potsdam Institute for Research on Global Warming Effects states: "We are on our way to a destabilization of the world climate that has advanced much further than most people or their governments realize" (Staff, Deutsche Welle, 2008). He further states: "When only one side fails to act,

industrial countries or developing countries, then a disastrous climate change will be inevitable" (Staff, Deutsche Welle, 2008). Replacing the fossil fuel car culture with alternative energy public transportation is only one of the essential steps needed. However, the car culture is an example of clinging to a non-viable lifestyle.

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References

Angier N. (2008) : A highly evolved propensity for deceit. New York Times 23Dec http://www.nytimes.com/2008/12/23/science/23angi.html.

Archer D. (2009) : *The Long Thaw: How Humans are Changing the Next 100,000 Years of Earth's Climate*. (Princeton, NJ: Princeton University Press).

Barringer F. (2008) : In reversal, court allows a Bush plan on pollution. New York Times 24Dec http://www.nytimes.com/2008/12/24/washington/24air.html.

Bartlett A.A. (2008) : Why have scientists succumbed to political correctness? *Teachers Clearinghouse for Science and Society Education Newsletter*, **27(2)**, 21.

Dewan S. (2008) : Coal ash spill revives issues of its hazards. New York Times 24Dec http://www.nytimes.com/2008/12/25/us/25sludge.html?partner=rss.

Dewan S. (2009) : Hundreds of coal ash dumps lack regulation. New York Times 7Jan http://www.nytimes.com/2009/01/07/us/07sludge.html?partner=rss.

Diamond J. (2004) : *Collapse: How Societies Choose to Fail or Succeed*. (New York: Penguin Group).

Ehrlich P.R., Ehrlich A.H. (2008) : Predicting future human population levels. In: *The Seventy Great Mysteries of the Natural World*, (Ed) M. J. Benton. (New York: Thames & Hudson).

Felsenthal M. (2008) : Fed beige book says economic activity weakened. Reuters 3Dec http://www.reuters.com/article/hotStocksNews/idUSTRE4B26VF20081203.

Friends of the Earth. (2008) : New roads = new pollution. 24Dec http://www.foe.org/economic_stimulus/.

Friedman T.L. (2008) : Win, win, win, win, win . . . New York Times 28Dec http://www.nytimes.com/2008/12/28/opinion/28friedman.html.

Gore A. (2008) : The climate for change. New York Times 9Nov http://www.nytimes.com/2008/11/09/opinion/09gore.html.

Heinberg R. (2007) : *Peak Everything: Waking Up to the Century of Declines*. (Gabriola Island, British Columbia, Canada: New Society Publishers).

Inglis B., Laffer. A. R. (2008) : An emissions plan conservatives could warm to. New York Times 28Dec http://www.nytimes.com/2008/12/28/opinion/28inglis.html.

Johnson B. (2008) : Al Gore: Clean coal's like healthy cigarettes. Think Progress 28September http://wonkroom.thinkprogress.org/2008/09/28/gore-clean-coal-cigarettes/.

Johnson K. (2008) : Coal warriors: Enviros take aim at clean coal myth. Wall Street Journal 5Dec http://blogs.wsj.com/environmentalcapital/2008/12/05/coal-warriors-enviros-take-aim-at-clean-coal-myth/.

Judson O. (2008) : Back to reality. New York Times 2Dec http://judson.blogs.nytimes.com/2008/12/02/back-to-reality/.

Kane P., Shear M. D. (2008) : "Green" jobs compete for stimulus aid. Washington Post 24Dec http://www.washingtonpost.com/wp-dyn/content/story/2008/12/24/ST2008122400068.html.

Kay J.H. (1997) : *Asphalt Nation: How Automobiles Took Over America and How We Can Take It Back*. (Berkeley, CA: University of California Press).

Krugman P. (2008a) : The widening gyre. New York Times 27Oct http://www.nytimes.com/2008/10/27/opinion/27krugman.html.

Krugman P. (2008b) : Fifty Herbert Hoovers. New York Times 29Dec http://www.nytimes.com/2008/12/29/opinion/29krugman.html.

Kunstler J. H. (2008) : Zombie economics. Alternet 26Nov http://www.alternet.org/environment/108481/zombie_economics:_don%27t_bail_out_the_system_that_gave_us_suvs_and_strip_malls//

Lakoff G. (2008) : *The Political Mind: Why You Can't Understand 21st-Century American Politics with an 18th-century Brain*. (New York: Penguin Group).

Landler M. (2008) : Chinese savings helped inflate American bubble. New York Times 26Dec http://www.nytimes.com/2008/12/26/world/asia/26addiction.html.

Levitt S.D. and Dubner S.J. (2005) : In: *A Rogue Economist Explores the Hidden Side of Everything*. (ed) F. Konomico. (New York: Harper Collins Publishers, Inc.).

Lynas M. (2008) : *Six Degrees: Our Future on a Hotter Planet*. (Washington, DC: National Geographic Society, by arrangement with HarperCollins Publishers, Ltd.).

Meyer P.B. (2008) : What does economics explain anyway? Gristmill 22Dec http://gristmill.grist.org/story/2008/12/21/165943/12.

Monbiot G. (2006) : *Heat: How to Stop the Planet Burning*. (London, UK: Penguin Group).

Monbiot G. (2008) : One shot left: The latest science suggests that preventing runaway climate change means total decarbonization.. Monbiot.com 25Nov http://www.monbiot.com/archives/2008/11/25/one-shot-left/.

Mufson G. (2008) : As fuel price fall, will push for alternatives lose steam? Washington Post 20Oct http://www.washingtonpost.com/wp-dyn/content/article/2008/10/19/AR2008101902073.html.

Nature Reports Climate Change. (2008) : Carbon is forever. 20Nov http://www.nature.com/climate/2008/0812/full/climate.2008.122.html.

Nelder C. (2008) : Oil prices are wrong – very wrong. Energy and Capital 24Dec http://www.energyandcapital.com/articles/oil-prices-wrong/802.

Oregon State University. (2008) : Global warming impacts on U.S. coming sooner than expected. Science Daily 18Dec http://www.sciencedaily.com/releases/2008/12/081216201404.htm.

Pearce F. (2007) : *With Speed and Violence: Why Scientists Fear Tipping Points in Climate Change*. (Boston, MA: Beacon Press).

Rugaber C.S. (20080 : Jobless claims surge to 26-year high. Huffington Post 24Dec http://www.huffingtonpost.com/2008/12/24/jobless-claims-surge-to-2_n_153283.html.

Shulman S. (2008) : *Undermining Science: Suppression and Distortion in the Bush Administration*. (Berkeley, CA: University of California Press).

Staff, Deutsche Welle. (2008) : German scientist warns climate change accelerating. Deutsche Welle 29Dec http://www.dw-world.de/dw/article/0,,3907790,00.html.

Steinhauer J. (2008) : In budget crises, states reluctantly halt road projects. New York Times 23Dec http://www.nytimes.com/2008/12/23/us/23works.html?hp.

Taleb N.N. (2004) : *Fooled by Randomness*. (New York: Random House).

Union of Concerned Scientists. (2008) : Undermining science: science sidelined from decision making. 4Nov http://www.ucsusa.org/scientific_integrity/abuses_of_science/undermining-science.html.

Virginia Rail Solutions. (2008) : *Shenandoah Rail Corridor*. (Kirkland, WA: Cooper Consulting Company).

Zeleny J. and Andrews E.L. (2009) : Obama warns of potential for trillion-dollar deficits. New York Times 7Jan http://www.nytimes.com/2009/01/07/us/politics/07obama.html?_r=1.

Zeller T. Jr. and Milkowski S. (2008) : Burning coal at home is making a comeback. New York Times 27Dec http://www.nytimes.com/2008/12/27/business/27coal.html?ref=garden.