America's Challenge.

Does Political Environmentalism Threaten America's Future?

Part Two

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Part Two

Fear

"Let me assert my firm belief that the only thing we have to fear is fear itself—nameless, unreasoning, unjustified terror…"

Franklin Delano Roosevelt March 4, 1933

In contrast to FDR's uplifting words here is Ehrlich's pronouncement...

"The battle to feed all of humanity is over. In the 1970s the world will undergo famines; hundreds of millions of people are going to starve to death in spite of any crash programs embarked upon now."

Paul Ehrlich 1968

Ehrlich went on spreading his mantle of fear by saying that "*if our population growth and water use continue, the United States will quite literally be drying up.*" And in 1969, *"Smog disasters" in 1973 might kill 200,000 people in New York and Los Angeles."* Ehrlich went so far as to suggest that the government place limitations on the number of children a couple could have: A policy adopted by the communist government of China[1].

Even though these kinds of apocalyptic events rarely if ever happen, the political environmentalists persist in spreading more fear by dredging up new pronouncements whenever the previous one looses effectiveness. Unfortunately, the media prints each new pronouncement without validating its premise or examining the history of other apocalyptic declarations: Inundated with these doomsday predictions the public starts to believe man is destroying the environment.

To put matters into perspective, consider each of these situations.

1. Nuclear Accident.

Chernobyl and Three Mile Island were serious disasters that have been exploited by the political environmentalists to the point that nuclear energy in the United States is feared by many people today. The China Syndrome, with Jane Fonda, amplified the fear the public had of nuclear power. Today, the Union of Concerned Scientists continues to spread fear by saying, "A severe nuclear accident has the potential to do catastrophic harm to people and the environment.[2]" This in spite of the fact that the nuclear industry has a proven record of safety over the past twenty years. In addition, new nuclear technology can eliminate the risks associated with the Three Mile Island and Chernobyl accidents.

2. Great Lakes Water Level

The September 2002 issue of the National Geographic trumpeted that the Great Lakes had "plunged" to the lowest level in thirty years. Not only was the headline inaccurate but it, and the accompanying story raised the fear of "What happens if the water levels don't rise again?" The facts belie the story. The lowest levels for the lakes were: 1926 for Lake Superior, 1934 for Lake

Erie, 1935 for Lake Ontario and 1964 for Lakes Michigan and Huron.

The fact is, all the lakes except Ontario reached their highest levels, rather than their lowest, in 1986: What people are reacting to now is the recent fall from these peak levels. The levels of the Great Lakes have risen and fallen over the past century, sometimes dramatically as is the case with Lakes Michigan and Huron. Three times in the past century (approximately 1918 to 1925, 1930 to 1940 and 1950 to 1960) the levels of Lakes Michigan and Huron have fallen at least as precipitously as the latest decline. The current level of most lakes is only slightly below their long term averages[3].

3. Oil Reserves.

Oil production could peak and then decline rapidly in ten years, according to Rifkin in his call to redistribute power on earth[4]. His dire prediction has been repeated many times over the past century. Some examples:

- 1914, U. S. Bureau of Mines: Total future production limit of 5.7 billion barrels, perhaps 10 year's supply[5].
- 1939, Department of the Interior: Reserves to last only 13 years. [6]
- 1951, Department of the Oil and Gas Division: Reserves to last 13 years. [7]
- The Club of Rome wrote in 1972 in its book "the Limits to Growth" that the world would run out of oil by 1990.

Contrary to the doomsday predictions, there is an ample supply of oil. The USGS survey in 2000 indicated that, worldwide, there are about 2120 billion barrels of oil (1471 bbl of proven and another 649 bbl yet to be discovered reserves) available outside the United States. This compares with the 539 billion barrels of oil produced outside the US over the past 100 years[8].

The rate of consumption has increased so the oil will be used more rapidly than in the past hundred years; but even if the rate of usage triples there is still a 100 year supply left in the ground. In addition, alternatives are also available such as tar sands and oil shale. Tar Sands, for example, have become economically viable with production costs in Canada under $18 per barrel[9]: And by one estimate there are 2,571 billion barrels of oil available from oil shale[10], albeit at a higher price per barrel.

4. Extinctions.

"It's the next annihilation of vast numbers of species. It is happening now, and we, the human race, are its cause," - explains Dr Leakey[11]. "Every year, between 17,000 and 100,000 species vanish from our planet"[12]. "Up to one-fifth of all living species could disappear within 30 years." [13] **"**Every time we lose a species, we lose an option for the future," … "We lose a potential cure for AIDS…"[14]

Here, the fear of a manmade apocalypse is coupled with an emotional fear surrounding a devastating disease. Yet, many scientists are very skeptical about these assertions.

Julian Simon[15] concluded that Myers'[16] claim of 40,000 species lost each year was "pure guesswork" with no basis in science: And about all the other claims of imminent loss of thousands of species Mann and Plummer[17] observed that "many of them were plucked from thin air".[18] The International Union for the Conservation of Nature (IUCN) can only identify 644 animal extinctions since 1600[19].

The large extinctions predicted by Myers and others are mainly for insects and plants: And there is no proof that large extinctions are occurring among ants, beetles, mosquitoes and fungus or vascular plants.

Only a small minority of Americans are political environmentalists: But these are the people who seize each new environmental issue as a way to advance a radical economic agenda.

Political environmentalists have said that "to capture the public imagination, we have to offer up some crazy scenarios, make simplified dramatic statements and little mention of any doubts one might have. Each of us has to balance between being effective, and being honest." This mantra espoused by Stephen Schneider[20] of Stanford University, is essentially a formula for misleading the public:

Why shouldn't we expect scientists to always be honest?

Michael Crichton in his lecture at Caltech[21] referred to "an emerging crisis in the whole enterprise of science—namely the increasingly uneasy relationship between hard science and public policy": And later he said. "Science, we are told, is no better than any other undertaking… facts don't matter." Crichton Said "These ideas [that relegate science to opinion]… anger me."

Unfortunately political environmentalists are well organized and politically active: They advance their agenda because the majority of Americans are unaware of the facts, are inundated with misleading or inaccurate information in the media (stories planted by political environmentalists) or are simply too busy making ends meet to have time to deal with issues that do not have an immediate impact on their lives.

This is an important charge; just as important as citing someone as being a communist in the 1940's and 1950's. The inference is that political environmentalists place their cause ahead of the interests of their country.

Nearly all Americans are concerned about the environment: Only a few are political environmentalists.

In addition to fear, discussed earlier, it is worth looking at the distorted claims of political environmentalists: And why would any responsible group make such distorted claims if it were not to advance an extreme political agenda?

Air quality.

In May 2003 the American Lung Association released its annual report "State of the Air". It is not easy to think of the American Lung Association as a political environmental group in view of their work earlier in the 20th century on behalf of tuberculosis; but they have adopted the tactics, if not also the beliefs, of the political environmentalists.

The ALA "State of the Air report for 2003" exaggerated the number of people exposed to ozone by the tens of millions. The simplest way to illustrate the tactics used by the ALA is to postulate the extreme case. Using the same tactics as used by the ALA in San Diego, LA and elsewhere, it would be possible to claim that everyone in the United States is at risk from ozone if one monitoring station in the U.S. exceeded the 85 ppb standard[22].

More specifically, here is how the ALA manipulated actual data (a summary of what is more fully described in *Clearing the Air*[23] published by the Reason Public Policy Institute). In San Diego County the only monitoring station to exceed the air quality standard was in Alpine with a population of 13,000, yet the ALA report inferred that the entire county of 2.8 million was in exceedance. In other words, only one station covering a population of 13,000 resulted in the ALA claiming that 2.8 million people were living in an area exceeding air quality limits.

How the ALA report treated Los Angeles is descriptive of how it treated other major cities. ALA claimed that all of Los Angeles was in exceedance on any day that one of the fourteen monitoring stations in the

county registered an exceedance even though the most densely populated areas never exceeded the EPA standard.

The ALA report claimed there were 35 days that Los Angeles County exceeded the eight hour ozone standard of 85ppb for eight hours, yet none of the county's fourteen monitoring stations registered anywhere near 35 days of exceeding this standard: In fact, the average exceedances for the monitoring stations was six times per year or 83% fewer days than the ALA claim of 35 days. The worst station, Glendora, had fewer than 20 exceedances. Four of the fourteen monitoring stations in LA did not have a single day in which they exceeded the standard.

Even more striking is the population distribution associated with the exceedances. LA, the city, has a population of over 3 million people yet the monitoring station in LA, the city, showed about three days (not 35) in which the ozone 85 ppb standard was exceeded. Long Beach, one of the fourteen monitoring stations, has a population of over 400,000 and it did not exceed the ozone standard at any time.

The Public Interest Research Group (PIRG) used a similar misleading tactic in their "Danger in the Air" report when it reported that California exceeded the 85 ppb standard on 130 days in 2001. Actually nearly half the monitoring stations had no exceedances and the average location had only seven.

These distortions are serious in that they have led Americans to believe that the air is getting worse when in fact it is getting better. By distorting the data the political environmentalist creates fear. Factually, only those people who are exposed to ozone levels much higher than the amounts shown by the average monitoring station and for long periods of time (over two hours at elevated levels of about 120 ppb) are at risk from ozone. It is this combination of exposure level and time of exposure that is critical, yet few Americans receive the necessary dosage, even when exerting a high level of physical activity, to be threatened by near term or long term adverse health effects.

Air quality is better: "In the early 1980's half the nation's monitoring stations registered ozone in excess of the one hour standard, and they averaged more than 12 such exceedances per year. But at the end of 2002, only 13% of the stations failed the one hour standard and they averaged just four exceedances per year[24]".

There is no question that air quality is getting better. Some additional facts about various pollutants between 1981 and 2001: Carbon Monoxide (CO) has been reduced by 61%: Sulfur Dioxide (SO2) by 50%: Nitrogen Oxide (NOx) by 14%: And Airborne Particulate matter (PM25) by 33% from 1980 – 2000[25].

In addition, conditions will only get better as the older cars are scrapped and newer cars, including SUV's, built to meet stricter emission standards become a larger percentage of the nation's fleet of automobiles.

Water

Here is how another group distorts an issue.

"Water, like energy, is a valuable resource that is too frequently squandered. Fresh, clean water is scarce and getting more so: of all the water on earth, less than 3 percent is fresh, and all but three-thousandths of that is locked up in glaciers or icecaps or is too deep in the earth to retrieve. Of the freshwater available in rivers, lakes, and accessible groundwater, an increasingly large fraction is polluted with biological, chemical, and radioactive contaminants."

Yet the facts belie these distortions and half truths that generate fear.

The United States has an ample supply of water and uses less than 10% of its renewable water supply each year: Only the southwest consumes more water than it receives as rainfall[26]. Developing countries often have a problem with safe drinking water but this is frequently a function of poverty and the lack of infrastructure rather than a lack of water.

Drinking water quality in the United States is excellent. Community Water Systems that had no violations of health based standards in 2002 served 94% of the population using these Systems. This was up from 79% in 1993. The fact that 251 million Americans served by Community Water Systems obtained their water from systems that had zero violations is a remarkable achievement, even if some question the thoroughness of the reporting by the states[27].

With respect to coastal waters only about 4% can be classified as having poor conditions. With respect to sediment contamination of coastal waters less than 1% of the samples had pesticides, metals or PCB content that was considered to have likely adverse ecological or biological effects. With respect to beaches fewer than 6% of "beach days" (days the beach would normally be open to the public) were closed or under an advisory in 2001 according to the EPA[28]. Given the sensitivity of officials to law suits if they fail to close a beach this would seem to indicate that beaches were generally safe.

Only a small percentage of lakes and streams in the Northeast (4.2% and 2.7% respectively) are now acidic. According to the EPA the problem has been reduced with one quarter to one third of the lakes and streams in three regions no longer acidic. Many eastern water bodies are naturally acidic so it raises the question as to whether the small number of acidic lakes and streams represents the norm rather than an ecological disaster[29].

Media Coverage.

Fear is the tactic used to secure media coverage. The following quote from Stanford climatologist Steven Schneider in Discover magazine in 1989 goes directly to the point:

> "On one hand we are ethically bound to the scientific method, in effect promising to tell the truth, the whole truth and nothing but…which means that we must include all of the caveats, ifs, and buts. On the other hand, we are not just scientists, but human beings as well. And like most people, we'd like to see the world a better place... To do that we have to get some broad-based support, to capture the public's imagination. **That, of course, entails getting loads of media coverage. So we have to offer up scary scenarios, and make little mention of any doubts we may have.**" [emphasis added]

The issue isn't whether there are problems but whether the problems are being distorted by the political environmentalists to create an atmosphere of fear: And whether fear adversely affects needed economic development.

Fear is a powerful weapon:
It causes paralysis, irrational behavior and confusion.
Confusion is the tactical element of fear.

Confusion.

Fear Always Springs from Ignorance.

Ralph Waldo Emerson

Political environmentalists rely on confusion to create a mystique around environmental issues; while enshrouding them in uncertainty and wrapping them in false impressions.

Confusion is created by the shear number of issues promulgated by political environmentalists and broadcast to Americans by the media: Confusion is compounded by the conflicting, and often misleading information concerning each of these issues.

The issues are so varied and so complex that no person can understand all the issues let alone the facts surrounding them. Most people have neither the time nor training to delve into all the issues, or even a small number of them. People are left in a fog with a hazy belief that there is trouble in River City: And like Professor Harold Hill, in the Music Man, political environmentalists rely on this to achieve their scam.

Consider this abbreviated list of environmental issues.

- Arsenic in the water.
- Depletion of aquifers
- Acid rain
- Ozone hole
- Non point source for water pollution
- PCB's
- Over fishing
- Fish habitat
- Endangered species
- Air quality
- Soil erosion
- Global warming
- Biodiversity
- Nuclear power
- Rain forests

A complete list of environmental issues would require several pages: Is it any wonder that people lump everything together without a clear understanding of the true state of the earth.

If the sheer number of environmental issues were not enough to bewilder the public, consider the confusion generated by the conflicting and often misleading information surrounding each issue.

Consider the following examples of claims made by various environmental groups as identified in the notes.

1. Power Plants Deplete Water Supply.

The claim is frequently made that power generation plants using fossil fuels consume water and that they are depleting our supply of fresh water. One such claim is that "39% of all water withdrawals[30]" are for cooling of power plants and that this water is not available for agriculture or other uses:

Such a statement is bogus since **98% of the so-called "withdrawal" is returned** to the river or lake from which the water was drawn[31]. Virtually all of the water would be returned to its source if it were not necessary to lower the temperature of the water before it is retuned to the rivers or lakes so as not to raise the temperatures of these bodies of water. The water that is "lost" is due to evaporation which is what cools the water.

2. Global Warming Disaster.

The claim is frequently made that Global Warming will cause the seas to rise by at

least a meter, glaciers to melt, the Gulf Stream to be altered, storms to increase etc.

The political environmentalist points to temperature records that show as much as a half degree Celsius of warming over the past thirty years.

What they do not mention is that these recent temperature readings have been distorted by the urban heat island effect and that satellite readings of temperatures in the troposphere have shown **virtually no rise in temperatures during this same period of time and that these readings have been validated by weather balloon readings**[32]. (The Troposphere is the layer of atmosphere closest to the Earth's surface and varies in depth from approximately 5 miles at the poles to 10 miles at the equator.)

Global warming is a complex subject and all too often the political environmentalist overstates the scientific evidence about global warming and then tosses in some fear factors to support their claim of impending disaster.

3. Autos Threaten Food Production

The claim is frequently made that the automobile threatens food production, air pollution and national security[33]. The rhetoric says that the time has come "to design transportation systems…for entire populations, not just the affluent minorities[34]". The claim is made that for every five cars added to the fleet of cars in America an area the size of a football field is paved over for roads and parking[35]: Extrapolating this figure to account for all the vehicles in the U.S. means that 39 million acres are paved with asphalt (an area roughly the size of Georgia). The logic then goes on to say that this land is taken from agricultural production and deprives the world of cropland. In addition to this the automobile pollutes and uses oil.

No mention is made of how poor people as well as average Americans need automobiles to go to their jobs, pick up the dry cleaning, shop for groceries or take vacations. The automobile expands our ability to obtain an education, choose where we work, where we live, where we recreate and where we go to church: In short it provides us with flexibility and with options. Not everyone can live in New York City: For that matter not everyone would like to live in such an environment.

The claim that 39 million acres are covered with asphalt because of automobiles is bogus: The acres covered with asphalt include roads and interstate highways. Trucks use these highways to deliver food, clothing, furniture, appliances and all kinds of other goods to grocery stores, department stores and shopping malls. Perhaps the people making-up the bogus claim of 39 million acres covered by asphalt intend for railroad tracks to go to every store and shopping mall: Even so, how would the food and furniture etc. get from the store to the home?

4. Wind Can Replace Fossil Fuels.

The claim is made that wind power can replace fossil fuel generated electric power and that there is already 32,000 Megawatts[36] of windpower installed worldwide with around 6000 Megawatts[37] installed in the U.S. By using big numbers the impression is left that wind power can produce a lot of electricity when in fact the amount is piddling.

Total installed generating capacity in the United States in 2001 from all sources, coal, nuclear, hydro etc., was 903,000 Megawatts. The 6000 Megawatts of installed windpower in the U.S. is a drop in the bucket.

The second reason windpower produces too little power to make any real contribution to our power needs is that the wind turbines have a capacity factor of around

30%: The 32,000 Megawatts of world-wide capacity can only produce around 9,000 Megawatts of actual power while the 6000 Megawatts of installed capacity in the U.S. can only produce around 1800 Megawatts of actual power.

It is like going to the grocery store to buy a quart of milk and only getting a third of a quart: The bottle is marked one quart but it is two thirds empty.

The reason for the low capacity factor is that the wind doesn't blow steadily: At times it blows too slowly to generate power and at other times it blows too hard and the units are disconnected to keep them from being damaged. In Europe during the heat wave of 2003 there was very little wind so that the wind turbines could not produce electricity when it was needed most for air conditioning.

The fact is, in 2002 windpower produced less than 1/4%[38] of all electricity generated in the United States.

Every one of the hundreds of environmental issues is complex and requires analysis to separate fact from fiction. It is all too easy for the political environmentalist to provide misleading information giving the impression that there is an impending disaster or that their solutions, such as windpower, can resolve the various issues. On analysis, nearly all the claims are found to be deceptive.

By mindlessly regurgitating the misleading information promulgated by the political environmentalist, the media is conditioning Americans to accept that which is untrue.

It is no wonder that there is confusion and that this confusion serves the interests of political environmentalists: And deters needed economic development.

Dubious Alternatives

Political environmentalists tout favorite alternatives as solutions: But most such alternatives are not solutions. Today, it is trendy to promote renewable energy such as wind and solar as a solution for generating electricity: And smart growth with multi-use development is supposed to eliminate the need for roads.

These alternatives often contain elements that are beneficial but fall far short of achieving the stated objective. They are often proposed as political ideas rather than as genuine solutions to economic problems.

Some alternatives can help; but few, if any, provide comprehensive solutions: In a free market economy, any alternative that solved a problem would have been quickly adopted.

Before looking at alternatives, here is how the current generating equipment works.

Traditional Generating Technology

The steam turbine has been the workhorse for generating electricity for the past 100 years with the gas turbine playing an increasingly important role since the mid 1950's. The turbine converts energy into rotating motion that drives a generator that produces electricity.

The steam turbine uses high temperature steam generated by a boiler that is fired with coal, oil or any combustible material that has a sufficiently high heat index. Typically the boiler heats water until it turns to steam and then reheats the steam until it reaches as high a temperature as possible given the physical limitations of steal and ceramics. At high temperatures the steel buckets used in steam and gas turbines creep as they spin at 3600 rpm, thereby making the buckets longer which can allow them to rub against the turbine's casing; which, if it happened, would cause a catastrophic failure.

The gas turbine burns natural gas directly inside the turbine much the same way that a jet engine, another type of gas turbine, burns jet fuel. There are two turbine elements mounted on different shafts in a gas turbine, one that drives a compressor the other that drives the generator. (The air compressor compresses intake air to make the unit more efficient.)

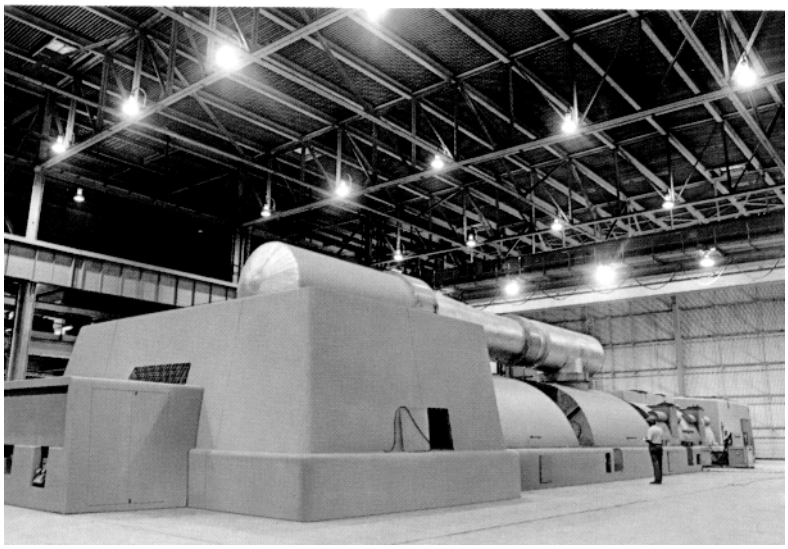
The steam turbine consists of stages so that the steam as it leaves one stage can be used in the next stage. Typically there will be a high pressure stage followed by intermediate and low pressure stages. As the steam passes through each stage it flows past buckets that absorb the energy and causes the turbine to rotate. The steam expands as it flows through each row of buckets and each stage of the turbine: For this reason the diameter of each row of buckets and each stage increases from around three feet at the first row of buckets to perhaps ten feet or more at the last row in the low pressure stage.

Each high pressure steam turbine rotor is made from a solid forging with the increasingly long buckets slid into grooves on the rotor. Gas turbines and steam turbines requiring larger diameters than can be cut from a single forging have wheels slid over the rotor, the same as an automobile wheel might be mounted onto its axle, to achieve the necessary diameter: In this way the buckets can be shorter and mounted on the outer periphery of the turbine wheel.

When all stages of the turbine have been manufactured they are erected on the factory floor and run using steam much the same as they will be operated at the power plant when the unit is finally installed. Each

rotor must be carefully balanced to ensure that the turbine doesn't vibrate. Using steam, the turbine is brought up to speed, typically 3600 rpm, with measurements taken on how the turbine vibrates: With these measurements the test operator can determine how large a weight (usually a few ounces) to add to the turbine rotor and where it should be placed.

The turbine is stopped and opened to allow the test engineer to reach into the turbine and attach the weight to the rotor in grooves that have been cut into it for this purpose. For the larger diameter low pressure units it is necessary for the engineer to climb into the unit while it is still very hot, perhaps 130 degrees, to attach the weight.



Steam Turbine Generator with operator standing at low pressure section.

This balancing procedure is continued for several runs until the turbine has virtually no vibration.

In a similar manner the generator rotor is balanced in a covered balancing pit. The completed generator rotor, which is as long as a Greyhound bus, is mounted in a pit on bearings and driven to its operating speed by a small steam turbine. Balance weights are inserted in the ends of the generator rotor until virtually all vibration has been eliminated. The rotor is brought up to speed several times while taking vibration measurements. Between each test run calculations are made to determine where to install the weights on the rotor.

The rotor forgings used in the turbines and generator rotors must be flawless otherwise the solid steel rotor can explode at high speeds. In one instance in the 1950's a test engineer was killed when the generator rotor being tested blew up and scattered huge chunks of forged steel for several hundred feet.

After testing, the units are disassembled, mounted on freight cars and shipped to their final destination where they are assembled and placed in service after additional testing. Each turbine generator can be several hundred feet long with the generators cooled using hydrogen (hydrogen reduces windage losses).

Any gas can be used in place of steam for driving a turbine so long as it doesn't attack the material from which the turbine is made.

Hydro turbines convert the kinetic energy of water to rotating motion: They drive generators running at lower speed than

steam or gas turbine generators. The lower speed is why the generators at a hydro power plant are much larger in diameter than at a steam or gas turbine power plant.

Electricity is generated at 13,000 or 24,000 volts and then stepped up using power transformers to between 110,000 and 765,000 volts for transmission to where it is needed. (There are some transmission or sub-transmission lines that operate below 110 KV.) The resistance of the power cable is reduced substantially at these very high voltages which reduces the amount of electricity lost due to heat from resistance. At the end of the transmission line the voltage is reduced to 13,000 or 7000 volts for distribution and finally to 120 and 240 volts before it enters a home.

A. Renewable Energy Alternatives.

Alternatives to steam or gas turbines for generating electricity, including wind, solar, biomass, geothermal and tidal, have received a great deal of media attention.

Renewable energy will have an almost inconsequential effect on supplying our energy needs between now and 2020, and probably negligible effect for at least fifty years after that. Some kinds of renewable energy can provide niche solutions or add, in a small way, to the nation's power generating capacity: As shown below, none, singly or in combination, can replace fossil fuel or nuclear power generation.

1. Wind Power

Wind power has recently caught the public's fancy. Wind turbines mounted on top of tall towers have become very sophisticated. General Electric has recently become the largest U.S. manufacturer of wind turbines which has put its imprimatur on the concept. These units are not the quaint windmills seen in the countryside of Holland. These are towers that stand 400 feet high (taller than the Statue of Liberty) using massive tubular pipe-like structures on which to mount the turbine with its rotor blades. Rotor blades that drive the turbine are over 200 feet in diameter. Each wind turbine unit is like a twenty or thirty story skyscraper with a rotor attached to it.

Each unit must be separated from adjacent units by a distance of about eight times[39] the diameter of the rotor blade. This means that huge areas are required to generate any significant amount of power. A wind farm will have 130 or so of these twenty story behemoths rising every third mile, either strung out along ridge lines and offshore shelves or in a group in areas where wind is plentiful such as the plains on the eastern slope of the Rocky Mountains.

Wind turbines. Note their height compared to barn and silo.

Some will view these towers as magnificent modern sculptures; others will see them as monstrous intrusions of beautiful scenery.

Much has been said about Denmark and its use of wind power: By some projections Denmark expects to obtain as much as 40%[40] of its electricity using wind power; though some doubt has recently crept into these projections[41]. It is worth remembering that Denmark is not the United States. Den-

mark is slightly smaller in area than Vermont and New Hampshire combined and has a population of 5.3 million which is about equal to that of Cook County IL.

It is true that the cost of wind generated electricity has fallen dramatically in the past thirty years with some indication that it is only a penny or two more costly per kilowatt-hour than electricity generated by fossil fuel or nuclear. However, a recent study (March 2004) by the Royal Academy of Engineering has determined that wind is twice as costly as fossil fuel or nuclear generated electricity.

It is unlikely that costs will decline much further in the near term as most of the technologies used in wind towers are established technologies that have already been thoroughly cost reduced: The tubular steel towers use established fabrication and welding technologies; the generators use a century old technology; and the gearing uses traditional manufacturing and gear cutting technologies. The rotor blades and control systems provide the major opportunity for cost or productivity improvements and these constitute only a small fraction of the total cost of building and installing wind turbines.

Wind power is capital intensive and currently costs $1,400 /KW.

In 2000 the U.S. consumed 3.4 Trillion KWHrs of electricity: And will need an additional 1.4 Trillion KWHrs by 2020, the date for the last official forecast. The hype about wind power says there is enough wind energy available to meet all of our needs. Though theoretically true, the task of converting wind energy into electricity is staggering.

It would take 266,256 wind turbines rated 2 Megawatt; or, over 600,000 wind turbines of the kind generally used today in the U.S. to generate all the additional 1.4 Trillion KWHrs of power needed in 2020: This is for the additional power needed by 2020 and doesn't address the 3.4 Trillion KWHrs currently used.

Consider that the largest number of wind turbines ever installed in the U.S. in one year was 1000 and it is obvious that installing sufficient wind turbines to merely accommodate the additional power needed by 2020 is out of the question. It is important to note that a large area is required for these wind turbines: Approximately 48,000 square miles are required for 266,256 2MW wind turbines[42].

In addition to the physical problems associated with installing hundreds of thousands of wind turbines, there are technical problems associated with intermittent power generated by wind power: The wind has to be blowing within a specified range of speeds otherwise the wind turbines stop generating electricity. Imagine what would happen if a third of the country suddenly stopped getting electricity because the wind stopped blowing: Or started blowing too fast. This means that there must be sufficient spinning reserves of fossil fueled generating plants standing by to take over when the wind stops blowing; or blows too fast. This adds costs and reduces the efficiency of the overall electric system.

There is also the problem of transmission lines from the wind turbines to the electric grid and how the electric grid accommodates the intermittent and variable power it receives from wind turbines.

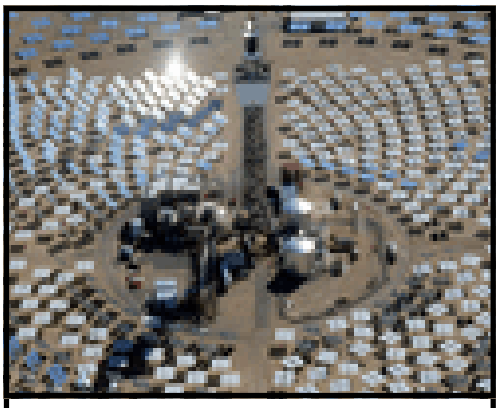
All of these considerations mean that wind can provide only a small amount of the nation's power: Perhaps 10% at the absolute maximum and more likely 4%.

2. Solar.

Fundamentally there are two kinds of solar generated power; photovoltaic and concentrating. Photovoltaic uses cells arrayed in panels to convert sunlight into electricity. Concentrating systems use mirrors to concentrate the sun's rays and project them onto a target that absorbs the heat which in turn boils a fluid that is then used to drive a turbine or engine[43]. Concentrating systems are experimental, though they could poten-

tially generate considerable power.

Photovoltaic solar is the kind most people think of when solar is mentioned. These



In one type of concentrating system mirrors surround a solar tower to focus light onto receiver at tower's top. This heats a fluid inside tower that is then used to drive a turbine

systems are typically mounted on roof tops. The amount of electricity produced by a system depends on the amount of sunlight and its intensity. A 600 square foot, roof mounted solar panel in Baltimore might generate 3650 KWHrs of power during a year while a similar system in Arizona might produce more than twice this much power. Costs therefore will vary widely depending on location. Generally speaking, the cost of photovoltaic electricity is between $.20 and $1.00 per KWHr versus the average purchase price for electricity of $.08 per KWHr[44].

Even with subsidies solar power is nearly always more expensive than fossil fuel generated electricity except possibly in the southwest where the insolation levels are highest[45].

Routinely someone will state that enough sunshine falls on the United States to supply all of America's electric power needs. The common perception is that photovoltaic cells can convert the sunlight to electricity so that all we need to do is build PV units on all our roof tops and, like magic, our electric needs have been solved. As noted above however, the Northern stretches of America are not very amenable to year round production of electricity from PV cells: Too many roofs facing the wrong direction, cloudy days, shorter days, and the incidence at which the sun's rays strike the roofs after passing through the atmosphere, more distance to travel in the winter than summer, reduces the amount of electricity that can be generated.

But what about the southwest deserts; plenty of space, lots of year round sunshine and not quite so far north? The yearly average in Albuquerque New Mexico is 240 watts per square meter[46]. It would require an area of 5,160 square miles, an area greater than the state of Connecticut, with PV cells edge to edge, no place for wiring or access for maintenance etc. to produce America's current electric needs; let alone future needs. In addition transmission lines would need to be constructed to get the power from New Mexico to the rest of the country. And of course there is the far higher cost of this power than power generated from fossil fuels or nuclear.

Passive solar is frequently mentioned in discussions on solar power and should not be confused with photovoltaic which also happens to be a passive system. Passive solar does not generate electricity but can help conserve electricity by using the sun to warm the interior of buildings; often by storing the heat from the sun in rock walls where it can be released at night.

3. Biomass

Biomass has referred to both liquid fuels and power generation. Ethanol and Diesel fuel alternatives have been produced from corn and other crops. There is a debate as to whether ethanol and other bio liquid fuels are cost effective and whether they can make a significant difference in the amount of oil we import. There should, however, be little debate over the inappropriateness of biomass for power generation.

Biomass can only provide a limited amount of power: Currently there is 7,000 MW of power generating capacity in the U.S. using Biomass, primarily wood scrap from paper mills. There are niche applications for biomass, such as digesters for animal waste that can be used to generate small amounts of electricity from methane gas while removing waste that could pollute waterways.

Biomass can not, under any conceivable scenario, replace any significant amount of current or future production of electricity in the United States. By one estimate every square foot of ground in every east coast state from Maine to South Carolina would have to be planted with poplar trees, or other fast growing crop, to produce enough electricity to meet America's additional power requirements in 2020; and doesn't address the 3.4 Trillion KWHrs currently used.

4. Geothermal

The immediate image of a geothermal resource is the Old Faithful geyser in Yellowstone Park. This is typical of the geothermal resource found near the earth's surface that can be tapped either to generate electric power or provide area heating: Unfortunately these types of geothermal resources are relatively scarce in the United States with most of them located in the western states.

Some of the opportunities for traditional geothermal production of electricity have already been exploited. Approximately 20 geothermal plants in the United States can generate 2,800 MW of electricity or .3% (three tenths of one percent) of total US power generation capacity. Geothermal resources currently identified in the United States could theoretically provide a total of 20,000 MW of capacity which is equal to 2.2% of total electric generating capacity in the U.S[47].

Another potential geothermal alternative is "hot dry rock". This is an experimental and futuristic proposal where water is injected deep into the earth to create steam from the very hot rocks located well below the earth's surface. One experimental well is being drilled in Australia to a depth of 3 miles to tap the "hot dry rocks" at that depth.

Realistically, geothermal can make only a very limited contribution to America's electricity requirements.

These geothermal resources should not be confused with using the relative constant temperature of the first several feet of the earth's surface to provide heating and cooling, such as with heat pumps. Use of the earth in this manner provides an opportunity for conservation but does not allow for the generation of electricity.

5. Tidal

Tidal systems use the wave action or currents in the ocean to generate electricity. These systems are at the prototype stage where a few have been installed to demonstrate the feasibility of the concept. One such system has been installed off the coast of the U.K., another off the coast of Norway and another, being developed by the U. S. Navy, off the coast of Hawaii. Two of these systems use windmill like vanes that rotate under water, driven by wave or tidal action, that in turn drive a generator. The system in Hawaii uses a buoy like device, bobbing up and down in the water, to pump hydraulic fluids that drive a generator. These units are installed in a hostile ocean environment so considerable work yet needs to be done to prove they are feasible.

The promoters of these devices predict that tidal systems could generate vast amounts of power. Realistically, if the concept works these devices could provide some power to communities located near the ocean and could, under the most favorable of scenarios, provide a limited amount of power to the grid.

B. Mass Transit Alternative.

Mass transit using rail has proven its worth in only a few cities, namely Chicago and New York and has had limited success in other cities. New York, often cited as proof that mass transit works, is unique in that Manhattan Island (a 13 ½ mile long by 2 ¼ mile wide urban core) has high density where less than one mile separates most subway stations: The subway stations on Manhattan are within easy walking distance for most people who live and work in Manhattan. People who live in the Bronx, Queens or Brooklyn have less ready access to subways with the subways funneling people to Manhattan in a typical hub and spoke system.

Typical mass transit using rail are hub and spoke systems funneling people from specific suburbs to the urban core: But in today's urban areas many people need to move circumferentially around the urban core. Traditional mass transit using rail is too inflexible to meet the transportation needs of most cities, though there are high density corridors where rail could make a contribution.

The rise of the Edge City over the past quarter century has created an environment where major edge cities ring what was formerly the urban core. Washington D.C. is ringed by nearly twenty edge cities, some of which, from East to West, include Bowie, Laurel, Rockville and Columbia Maryland: and Tysons Corner, Reston and Fairfax Center Virginia[48].

There are nearly 200 existing or emerging edge cities surrounding 34 major metropolitan areas[49]. In many of these metropolitan areas the challenge is to move people between the edge cities rather than from the suburbs to the urban core. Complicating the matter is that new edge cities are emerging so that a new rail system may become obsolete before it is built. Gainesville Virginia is an emerging edge city several miles beyond Manassas which together with Leesburg Virginia, in western Loudon County, could become edge cities.

Only roads are able to provide the flexible circumferential transportation needed in these situations.

Extending Washington D.C.'s metro system to Tysons Corner, Reston and Dulles at a cost of $4 billion (and perhaps someday to Leesburg) fits the model of a high density corridor that could be connected to the traditional urban core by rail: But it does nothing to solve the transportation needs between the edge cities: And may be the most costly least flexible solution to transportation along the Dulles corridor.

Except for a few cities, transit carries too few riders to affect urban congestion[50].

C. Multi Use High Density Alternative.

Some groups have advocated concentrating new residential development in multi use high density areas: Typically these have been associated with so-called smart growth proposals. The multi-use high density alternative combines residential with commercial and office space; where the residential would consist of high density apartments, condominiums and possibly town houses. These developments would, ideally, be located around mass transit stations, but could also be a development surrounded by open space. The concept assumes that people who live in these multi-use high density developments will also work in them, shop in them and run their daily chores, such as to the dry cleaners, in them.

Advocates of these proposals argue that multi-use high density development would reduce the need for roads and eliminate sprawl.

There may be situations where such an approach would reduce traffic, but there is little proof that it does: People in these high density apartments and condominiums will still own automobiles. Manhattan, with per-

haps the best mass transit system in the world, is still awash in automobiles.

The "Multi Use High Density Alternative" confronts a fundamental American dream; the dream of home ownership with a plot of land people can call their own. "Housing is more than shelter against the elements. In America, it represents an important lifestyle choice and source of wealth[51]". Multi use high density proposals have also had the negative effect of raising housing prices and making housing less affordable[52]. The people who are hurt the most are the poor and the immigrants who are trying to grasp a piece of the American Dream for themselves.

If the market place wants this type of multi use high density development it will happen; but this alternative is not a solution to traffic problems.

D. Other—Telecommuting.

Telecommuting is promoted by political environmentalists as a solution to traffic problems. Politicians jump on the bandwagon because it is a feel good alternative that doesn't cost the government money.

Unquestionably there are situations where telecommuting can work but it is not a solution to traffic problems or the need for roads.

Broadband communications will facilitate the transfer of information. X-ray and CAT Scan pictures will be sent from clinics to doctors, reports can be sent from home to the office, reporters can file their stories from home, meetings can be conducted over the Internet from home, and some research can be done from home. But most work requires the interface between people and ready access to specialized information, accounting and sales reports for example, which can only happen in an office environment.

Once again, if it really worked a great many more people would already be telecommuting.

The effect of these dubious alternatives is that they dissipate financial resources, accomplish little and can not meet the needs of America's growing population.

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Part Two Notes

1. Ehrlich also suggested forced vasectomies for males.
2. Union of Concerned Scientists web site May 2003
3. Current data can be obtained from http://www.glerl.noaa.gov/data/now/wlevels/
4. The Hydrogen Economy by Rifkin. 2002
5. Julian Simon: The Ultimate Resource (Now The Ultimate Resource 2) (Princeton: Princeton University Press, 1981; 2nd edition, 1996).
6. ibid
7. ibid
8. USGS world Petroleum Assessment 2000. See USGS Fact Sheet FS-070-00 April 2000.
9. Syncrude Canada Ltd., May 2003
10. John R. Dyni, Oil Shale Committee Chairman, Scientist Emeritus U.S. Geological Survey Federal Center, Box 25046, MS 939Denver, CO 80225, February 27, 2000
11. Dr. Richard Leakey, paleoanthropologist and environmentalist, head of the Kenya Wildlife Service. Dr. Leakey's parents, Louis and Mary Leakey, were pioneers in paleoanthropology. Dr. Richard Leakey was chosen by TIME Magazine as among the 20 most influential scientists of the 20th century.
12. *The Sixth Extinction* by Richard Leakey and Robert Lewen, Doubleday , 1995
13. Washington Post, Tuesday, April 21, 1998 By Joby Warrick Staff Writer
14. From February 1999 issue of the National Geographic magazine.
15. Julian L. Simon, professor of business administration at the University of Maryland and renowned author. Remembered by many for his bet with Paul Ehrlich that Simon won. Simon's central premise was that people are the ultimate resource. "Human beings," he wrote, "are not just more mouths to feed, but are productive and inventive minds that help find creative solutions to man's problems, thus leaving us better off over the long run."
16. Norman Myers is an Honorary Visiting Fellow of Oxford University. He has served as Visiting Professor at universities from Harvard to Stanford and is a foreign member of the U.S. National Academy of Sciences. He works as an independent scientist, undertaking research projects for the U.S. National Research Council, the World Bank, and United Nations agencies. He has received the UNEP Environment Prize, the Volvo Environment Prize, and, most recently, the 2001 Blue Planet Prize for being "the first to alert the world to the mass extinction underway, and warning of many other fundamental challenges."
17. **Charles C. Mann** is contributing editor of *The Atlantic Monthly.* He wrote *Noah's Choice: The Future of Endangered Species* (1995), with Mark L. Plummer. **Mark L. Plummer**, formerly an economist with the Federal Trade Commission, is Senior Fellow at the Discovery Institute in Seattle, where he specializes in environmental issues. He has written for various economic journals, *The Atlantic Monthly*, and *Science*.

18. From Endangered Species by Randy T. Simmons 2002, who quotes from *Noah's Choice: The Future of Endangered Species*, Knopf 1995.
19. From Endangered Species by Randy T. Simmons 2002
20. Stephen H. Schneider is a professor in the Department of Biological Sciences, a Senior Fellow at the Center for Environment Science and Policy of the Institute for International Studies, and Professor by Courtesy in the Department of Civil and Environmental Engineering at Stanford University since September, 1992.
21. Caltech Michelin Lecture, January 17, 2003. "Aliens Cause Global Warming" by Michael Crichton. Born in Chicago, Illinois, October 23, 1942. Educated at Harvard University, Cambridge, Massachusetts, A.B. (summa cum laude) 1964 (Phi Beta Kappa). Visiting Lecturer in Anthropology at Cambridge University, England, 1965. Henry Russell Shaw Travelling Fellow, 1964-65. Entered Harvard Medical School, M.D. 1969; spent one year as a post-doctoral fellow at the Salk Institute for Biological Sciences, La Jolla, California 1969-1970. Visiting Writer, Massachusetts Institute of Technology, 1988. Novels:

    THE ANDROMEDA STRAIN, Knopf, 1969
    THE TERMINAL MAN, Knopf, 1972
    THE GREAT TRAIN ROBBERY, Knopf, 1975
    EATERS OF THE DEAD, Knopf, 1976
    CONGO, Knopf, 1980
    SPHERE, Knopf, 1987
    JURASSIC PARK, Knopf, 1990
    RISING SUN, Knopf, 1992
    DISCLOSURE, Knopf, 1994
    THE LOST WORLD, Knopf, 1995
    AIRFRAME, Knopf, 1996
    TIMELINE, Knopf, 1999
    PREY, Harper Collins, 2002

22. There are two ozone standards used by the EPA. The first is the "one hour standard" that requires that daily ozone levels exceed 125 parts per billion (ppb) on no more than three days in any consecutive three-year period. The "eight hour standard" established in 1997 requires that an average of the daily eight hour average ozone level from the most recent three years not exceed 85ppb.
23. The data for the ALA and for PIRG were taken from the report *Clearing the Air* by Joel Schwartz of the Reason Public Policy Institute, and for data for the ALA was in turn based on the American Lung Association's State of the Air 20003 Report.
24. Clearing the air by Joel Schwartz, Reason Public Policy Institute
25. Ibid and the EPA.
26. From USGS. See URL http://water.usgs.gov/watuse/misc/consuse-renewable.html
27. Technical Document, EPA Draft Report on the Environment 2003
28. Ibid
29. Ibid
30. From *Plan B: Rescuing a Planet Under Stress and a Civilization in Trouble* by Les-

ter R. Brown. Similar statements can be found in many other sources such as *"The Last Straw,"* a 2003 study by Western Resource Advocates.

31. From, *Powerplant Technology* by M. M. El-Wakil, McGraw-Hill is the publisher. "A Modern 1000-MW fossil-fuel plant with a efficiency of 40% would reject about 1500 MW at full load. This is roughly equivalent to 517 X 10^7 Btu/hr and uses about 570,000 gal/min. of circulating water, based on a 18˚F temperature rise across the condenser. A water-reactor nuclear plant, with a efficiency of 33%, would reject 683 X 10^7 Btu/hr. Depending upon climatic conditions, the portion carried by evaporative mechanism is about 75% in hot weather and 60% in cold weather. It would result in evaporation, and hence the need for makeup, of about 7,500 gal/min for the fossil plant and 10,000 gal/min for the nuclear plant in hot weather. In cold times the figures would perhaps be reduced by 20 percent. Additional makeup is required for blowdown and cooling-tower drift. The balance of heat rejected is mostly due to heating the air, and is greater in cold than in hot weather. Blowdown is normally 20 percent and drift is 2 to 2.5 % of the evaporation loss."
32. The University of Alabama-Huntsville satellite temperature data compiled by John Christy and Roy Spencer.

    The Greening Earth Society, www.co2andclimate.org publishes monthly track of temperatures in the northern and southern hemispheres that show little if any global warming. There is a miniscule .3 degree C increase in the northern hemisphere and no change in the southern hemisphere since 1980 June 2003's global average temperature departure was -0.01°C. The Northern Hemisphere's temperature departure was 0.167°C and the Southern Hemisphere's -0.187°C
33. PEW, Sierra Club, Friends of the Earth.
34. From *Plan B: Rescuing a Planet Under Stress and a Civilization in Trouble* by Lester R. Brown.
35. Ibid
36. From Wind Force 12: A Blueprint To Achieve 12% Of The World's Electricity From Wind Power By 2020, Executive Summary.
37. From NREL Report November 7, 2003 by Larry Flowers, page3 10 and 11. Total US installed capacity as of 7/31/03 4,736 MW. Total new installations for all of 2003 were 1700 MW (according to American Wind Energy Association) some of which was included in the 7/31/03 NREL total.
38. From EIA Table 1.2 Energy Production by Source, 1949-2002, http://www.eia.doe.gov/emeu/aer/txt/ptb0102.html. Latest available as of this writing.
39. From Danish Wind Energy Association http://www.windpower.org/en/tour/wres/park.htm. "As a rule of thumb, turbines in wind parks are usually spaced somewhere between 5 and 9 rotor diameters apart in the prevailing wind direction, and between 3 and 5 diameters apart in the direction perpendicular to the prevailing winds."
40. Wind Energy Policy in Denmark Status 2002, By Soren Krohn, Managing Director, Danish Wind Industry Association, 22 February 2002.

41. From Hemscott PLC (UK) news item on Vestas. "The [Danish]government there is withdrawing the subsidies it had previously given to wind power. The new Danish government are in favor of canceling 3 planned sea-based wind farms at a total value of 5 billion Danish Kroner. [1 $ ~ 6 Dkr]. Cancelling the sea-based wind farms, will save the Danish taxpayers 900 million Dkr per year.

    The numerous wind turbines in Denmark have distorted the market for electricity and raised Danish electricity prices to one of the highest in the world. The minister of Business and industry, Bent Bendsen, is concerned about the social and industrial consequences if Denmark keeps building wind turbines as they have far exceeded the safety margin for such intermittent energy supplies."

42. Using empirical data, several scientists have estimated that 5 kw per acre are generated by the typical wind farm. This translates into 29,074,040 KwHrs of electricity per square mile per year from the typical wind farm. See *The Solar Fraud* by H. C. Hayden for greater detail.

43. Concentrating Solar Power Technologies:

    These technologies use mirrors to concentrate sunlight to up to 5000 times its normal intensity.

    Parabolic trough systems use linear parabolic concentrators to focus sunlight on a receiver tube filled with a heat-transfer oil. The heated oil passes through a heat exchanger to create steam, which turns a turbine generator…similar in this respect to traditional power generation.

    Power towers use sun-tracking mirrors, called heliostats that focus the sunlight onto a receiver mounted on top of a tower. The solar heat is collected in a nitrate-salt fluid that is used to generate steam (as above) using a conventional turbine generator to produce electricity. The salt solution can store the heat energy for a period of time so that the turbine generator can be run after sunlight is no longer available.

    Both the parabolic trough and power tower systems can be operated as hybrid systems using natural gas when sunlight is not available. Both are intended for use as large scale units rated 30 MW or above.

    Dish engine systems use a parabolic dish with mirrors to focus the sunlight onto a receiver mounted on the dish (similar to a radar dish). Fluid in the receiver is heated to around 1,400 degrees F, which is used to generate electricity in a small engine connected to the receiver. The most common type of heat engine used in this system is the Stirling engine. The primary advantage of the dish-engine system is that it is relatively small, rated 10 to 50 KW, and can possibly be grouped as modules to form a large system.

44. From *Renewables False Promise* 2002, www.tsaugust.org

45. Insolation is the measure of sunlight intensity in KWHr/Meter Squared.

46. *The Solar Fraud* by Howard C. Hayden

47. From *Renewables False Promise* 2002, www.tsaugust.org

48. *Edge City* by Joel Garreau, Doubleday 1992.

49. Ibid

50. The Journalist's Guide to the American Dream, 2003

51. Ibid

52. Ibid