

**What would you ask  
the next President of the United States  
to do in the first 100 days  
of the Administration  
to address climate change?**

**An Essay for  
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## **What would you ask the next President of the United States to do in the first 100 days of the Administration to address climate change?**

As I write this, the question has become a moving target. Recent statements by the IPCC,<sup>1</sup> by corporations such as Dupont,<sup>2</sup> Alcoa, and Exxon,<sup>3</sup> by the European Union,<sup>4</sup> and by leaders of conservative groups<sup>5</sup> all indicate that we have at last reached consensus that human-related activities are affecting the climate. In his 2007 State of the Union address,<sup>6</sup> President Bush acknowledged the importance of the issue and called for specific changes in government policy aimed at reducing greenhouse gas (GHG) emissions. These are hopeful and encouraging developments. Nevertheless, those policies have not yet been enacted, and there are many other plausible and effective policies that remain politically challenged. It is worthwhile to begin here with a list of some of the solutions and strategies that are being widely discussed by scientists, business leaders, and policy makers, add any new ideas, and from there, to expand the frameworks that shape our approaches to the problem itself.

First, to make an extremely complex problem very simple, the leading cause of human-related climate change is GHG emissions, with carbon being the most significant component.<sup>7</sup> The deeper cause of climate change, however, is economic growth, which goes hand-in-hand with increasing energy use. There are two main ways to reduce carbon levels in the atmosphere: (1) Reduce carbon emissions, and (2) Remove, or Sequester, existing atmospheric carbon. There are many existing technologies that can be used to greatly reduce these emissions, and many more promising developments on the way.

Government can support the implementation of these solutions in several important ways:<sup>8</sup>

1. **Provide financial support** for research and development, tax incentives, subsidies, etc.
2. **Assist in the deployment** of new energy sources, new technologies and other solutions by:
  - a. **Giving such products preferential treatment in government purchasing**, on a temporary basis, to help establish market volume;
  - b. **Removing barriers to distribution** (for instance, remove pricing, policy, and regulatory restrictions, to expedite renewable energy providers' access to the power grid);
  - c. **Investing in necessary infrastructure**. Our transition to the new energy economy is today's equivalent of building the national highway system. For example, much of the country's best wind energy resources are in remote areas that require an extension of the power grid to become viable;
  - d. **Investing in education and research**. America can assure its leadership in the development of new technology by providing educational and research opportunities;
  - e. **Educating the public**. I believe the public is very aware of the seriousness of potential impacts of global warming, and very willing to make changes to head off disaster. If anything, they may be more confused and perplexed by a *lack* of consistent and noticeable change. They need better understanding of the issue, as well as awareness of the availability and use of new technologies;

- f. **Eliminating policies, practices, and incentives** that externalize costs or have the effect of promoting activities and development that increase or perpetuate GHG emissions;
3. **Promoting conservation and the Power of One** (one individual, taking one step toward sustainability, has a cumulative and rippling positive effect and keeps us from feeling overwhelmed);
4. **Regulating emissions.** Although no one likes government intervention in a free market, in this instance there is a systemic flaw that has resulted in a market failure, and government intervention is the simplest way to correct the issue before it becomes catastrophic;
5. **Participating in a carbon trading market.** This hinges on (g) and (h). By setting a cap on carbon emissions, the government makes units of carbon fungible. Allowing a market to freely exchange these units should result in the most efficient reduction of emissions. America already participates in such exchanges for other regulated emissions, and some large corporations have instituted internal exchanges for carbon to meet their own GHG reduction objectives in a cost-effective manner.

The list above is by no means exhaustive, but it covers most of the widely discussed solutions to GHG. I have the following idea to offer which I have not seen anywhere in my research on solutions:

6. **Establish a Green Corps.** This would be an organization similar to the Peace Corps, except its mission would be to restore forests and grasslands both in the US and in the developing world. Communities in regions suffering from deforestation, overgrazing, desertification, erosion, and other loss of vegetative cover would invite the Green Corps (GC) to work with them to create an economically and ecologically viable restoration project that could be based on sustainable agriculture/grazing and soil building, sustainable forestry, eco-tourism, etc. The GC would provide resources, advisors, and stock to replant the area. Companion projects to provide irrigation or other support would be undertaken if necessary. Local inhabitants would be paid to do the work and trained to run the business and monitor and protect the resource. Communities would be required to agree to maintain the carbon-sequestering capacity of the mature forest or grassland ecosystem in perpetuity. If carbon credits are generated by the project, they can be sold, with most of the revenue being used to fund the enterprise, and a portion going to the GC to help fund the next project.

The direct impact on GHGs would admittedly be small, but the impact of motivating people around the world to work cooperatively for change could be immense. The program's goals would be to:

- i. Sequester a quantifiable amount of carbon in vegetation and soil;
- ii. Restore damaged ecosystems, with collateral benefits such as erosion control, microclimate management (such as protecting coastlines from storm surge or providing large shaded areas), soil improvement, watershed management, improved water quality, increased productivity, increased trade and economic opportunities, and improved living standards;
- iii. Enable developing countries to benefit economically from sustainable development while reducing GHG emissions;

- iv. Empower the inhabitants of impoverished regions to develop a sustainable livelihood;
- v. Align incentives from the grassroots up to make protection of healthy ecosystems and prevention of harmful practices (such as poaching, slash and burn, strip mining, and monoculture) a community and a national imperative;
- vi. Provide one answer to the dilemma of developing countries that currently can't afford to offset increasing carbon emissions as their economies struggle to grow;
- vii. Provide information and education on sustainable practices;
- viii. Acknowledge in a tangible way the reality that climate and solutions extend beyond borders;
- ix. Create goodwill and lasting bonds of friendship between the US and developing nations;
- x. Position the US in a leadership role in addressing climate change through appropriately scaled, community-based initiatives, both globally and at home.

*All of these solutions (1 through 6) may not be enough to reverse the warming and destabilization of the earth's climate. The problem is not with our technology per se, nor with the willingness of people, businesses, and governments to do what is necessary. The problem is in the frames of reference from which we view ourselves, our economy, our nation, and the world.*

In Systems thinking, there are key places at which a small amount of leverage can result in transformational change. If we look at global climate as a vast and complex system, the leverage humans have been exerting is simply to allow a positive (self-reinforcing) feedback loop to override and overwhelm the many negative (equilibrium-seeking) feedback loops. Ironically, this is a relatively low level point of leverage. It actually takes a fair amount of persistent action to change the system by changing a positive feedback loop.

This could be good news. First, ceasing the activities that create the positive feedback will go a long way toward restoring equilibrium. But more importantly, there are higher order leverage points that can be used to bring about profound change with much less effort. These "Places to Intervene in a System," as they were identified by Donella H. Meadows, include:

- 9. Numbers (e.g., piecemeal subsidies, taxes, standards);
- 8. Controlling material stocks and flows (the amount of GHGs going into and out of the atmosphere);
- 7. Regulating negative feedback loops (the way the climate or the economy maintain equilibrium). Our goal should be to do whatever we can to allow the negative feedback loops to work;
- 6. Driving (strengthening) positive feedback loops (self-reinforcing patterns). A system with a positive feedback loop that goes unchecked will *always* self-destruct, either by spiraling out of control, or by corkscrewing into the ground. This is the main mechanism of the current climate imbalance, aggravated by the long delay between the time the imbalancing activity occurs and the time the climate reacts;
- 5. Information flows (creating *new* feedback loops). If a new policy attaches a negative feedback loop to a positive loop, it will weaken and interfere with the signal to help bring it under control;

4. The rules of the system. We can't change the physical laws the climate obeys, but we *can* change the rules of our own invented systems, such as the economy, to great effect;
3. The power of self-organization (a system's ability to adapt on its own). A cap and trade carbon market is an excellent example of this;
2. The goals of the system (equilibrium for the climate, quantitative growth in the case of the US economy). Changing the goal of the economy, perhaps to qualitative growth, has the potential to "solve" the climate issue in one fell swoop;
1. The mindset or paradigm out of which the goals, rules, and feedback structures arise. *Beliefs*.

These levers are listed here from least to most powerful, in systems terms. In this sense, fiddling around with the numbers amounts to "arranging the deck chairs on the Titanic," although they may have significant symbolic value (perhaps effecting a change at lever 4 in our list). Likewise, the rate at which the "stock"—carbon—is "flowing" into the atmosphere is not something we can completely stop. Next, working with feedback loops offers moderate leverage. Changing the rules and goals of a system is more effective. The most powerful lever of all is the beliefs out of which the system arises. One good push there, and everything can change in an instant.

There is simply not enough space here to explain the workings of these levers, so I refer you to the source notes for details and examples.<sup>9</sup>

In the US, there are currently direct incentives that have the effect of increasing carbon emissions, while traditional accounting practices externalize the costs of pollution, depletion, and depreciation of resources. We gift ourselves with artificially cheap energy, labor, and materials, because there has been little immediate feedback that this was a problem. These costs are real, and must eventually be paid by someone, whether or not we enter them on the books. The effect of this practice has been to delay some critical feedback. At last, the signal has looped back, and the bill is coming due.

However, the payment required—that is, the investments and technology to reduce emissions, plus the necessary changes in lifestyles and habits—will be far less than the cost of ignoring climate change, doing too little, or acting too late. It may be a bitter pill, but we must change this rule.

Even in a diverse society such as the US, we share a common set of assumptions about the way things are. These beliefs are so pervasive, they are as invisible to us as water to a fish. They shape virtually every action we take, every word we speak. Many of these beliefs were extremely useful for a particular time and place, but are dysfunctional for a more mature society that has reached every corner of the planet and beyond. Though we take these beliefs as utterly granted, many of them are regarded as fantastic by other cultures. They are simply beliefs, and they can be changed by choosing to change them. If we think of ourselves as stewards of the planet, if we notice that we are no longer living on a frontier, if we measure the good life in qualitative instead of quantitative terms, if we deeply understand how interconnected we are, if we look at systems as a whole, as well as by reductionist methods, if we

assess and take responsibility for consequences broadly, in space *and* time, if we choose to do what is right, regardless of what others do or don't do, *then* we may find a solution.<sup>10</sup>

On March 1<sup>st</sup>, at the Sustainable Opportunities Summit in Denver, Colorado, the closing session for the day featured a panel of business leaders and legislative and policy experts who addressed the topic of how the private sector can help shape a statewide effort to reduce greenhouse gas emissions. They noted many of the strategies listed here (1 through 5). They spoke of promising technologies, research, legislation, and market-based approaches. Then the floor was opened for questions, and someone asked, "What's on your wish list? After we've implemented the policies you've talked about here, if it were possible that in a few years you could get any policy change you wanted, what would it be?"

No one on the panel had a reply.

To me, that was a little bit shocking and disappointing, although not completely surprising. After all, I'd been researching the solutions proposed by our best and brightest. The first steps, the ones that seem possible, are already well-known. The dismaying part is that the evidence tells us that those steps will not be enough. The frightening part is that we don't yet know what the ultimate solution will be.

*That is why it is time to intervene at the level of beliefs.*

As long as we remain in our current frames of reference, the problem of climate change may be unsolvable. Not only that, but we can't even *imagine* what the solution might be. Our vision is confined by the box we are in.

Ms./Mr. President, use your first 100 days to wholeheartedly implement the policies listed here, and to create a Green Corps. But more important than those steps, use them to introduce a new language to the American people. Speak of *stewardship*. Talk more about *quality* (of life, of work, of service) and less about quantity (GDP, economic growth, standard of living). Throw the word *community* around a lot, especially when you're talking about international trade, and ecological systems, and people who are making your job difficult. Above all, paint for us a hopeful picture of what America and the world will look like in the future, not at the end of your term, but at the end of our next 230 years as a nation. Refer to this picture often, especially when there are decisions to be made, and help us imagine the great-grandchildren of our great-great-great-grandchildren in that scene.

You may choose other words than the ones I offer here, perhaps more subtle and politic. The important part is the meaning, and everything those words carry with them. This is how we will learn to live, and think, and imagine, and believe in a different way.<sup>11,12</sup> It is the gentlest manner I can find to make some difficult and uncomfortable changes in how we think of the world, and ourselves in the world. However, I believe that from this new frame of reference, we will find that it is the easiest thing in the world to solve the problem of climate change, and many others. Help us believe in the Power of One:<sup>13</sup> One Person, One Nation, One Step at a time, the world will change.

## Source Notes

- 1 WMO Intergovernmental Panel on Climate Change (IPCC), UNEP, *Climate Change 2007: The Physical Science Basis*, Summary for Policymakers, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, February, 2007.
- 2 USCAP, *A CALL FOR ACTION: Consensus Principles and Recommendations from the U.S. Climate Action Partnership: A Business and NGO Partnership*, January 22, 2007.
- 3 Jeffrey Ball, "Exxon Mobil softens its climate-change stance," *The Wall Street Journal*, January 11, 2007.
- 4 William Echikson and Adam Cohen, "EU Leaders Agree on Climate Plan," *Wall Street Journal*, *March 10, 2007*
- 5 President George W. Bush, *The State of the Union*, January 23, 2007, <<http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html>>.
- 6 Barbara Bradley Hagerty, *Evangelical Leaders Urge Action on Climate Change*, February 8, 2007, <http://www.npr.org/templates/story/story.php?storyId=5194527>
- 7 IPCC, *Climate Change 2007*, February, 2007.
- 8 Gathered from numerous sources in print, on-line, on public radio, and through in-person conversations with scientists, experts in the energy industry, and economists.
- 9 Donella H. Meadows, a.k.a. Dana Meadows, *Places to Intervene in a System, Whole Earth*, Winter 1997. This article is available on-line at the Rocky Mountain Institute website, at <<http://www.rmi.org/sitepages/pid790.php>>. If the reader is unfamiliar with systems theory, it provides a lucid, brief overview of the aspects that pertain to this paper. Following are some notes and examples of how systems theory is relevant to climate change policy.

7. Negative feedback loops are information processes by which a system maintains balance. The atmosphere warms up; the excess heat is absorbed by the oceans; more water evaporates because of the increased temperature; this creates more cloud cover which reflects more solar radiation, which cools the atmosphere. Of course, our climate is driven by thousands of interacting feedback loops, so this example is oversimplified, but it illustrates how negative feedback works to seek equilibrium. This is the reason there is so much "noise" in the data, which has made it difficult to discern an anthropogenic trend. Our goal should be to do whatever we can to allow the negative feedback loops to work.

6. Positive feedback loops, on the other hand, are self-reinforcing. We use energy to run factories and farm equipment which produce goods and provide jobs, leading to prosperity and greater demand, which drives investment in more production, which uses more energy to produce more, etc. Economic growth is a positive feedback loop. A severe economic *decline*, such as happened in the Great Depression, is also a positive feedback loop, because it is self-reinforcing, although in a downward direction.

Positive feedback loops are normally held in check by interactions with regulating feedback loops, such as limited resources, and costs. A system with a positive feedback loop that goes unchecked will *always* self-destruct, either by spiraling out of control, or corkscrewing into the ground. The problem is, we like the positive feedback loop of economic expansion, and we've learned to negate many of the regulating influences.

Another important aspect of all types of feedback loops is the timing of the feedback. What if the temperature sensor on your home thermostat could sense a 2-degree temperature change instantly, but didn't send the signal to turn on the HVAC for 12 hours? Chances are, the air conditioner would be on when your house was cool, and the furnace would be working furiously during the heat of the day, exacerbating the temperature extremes. Now, put that sluggish thermostat in a nuclear reactor's cooling system, and imagine the consequences.

When the feedback signal takes too long to register, the system may swing wildly from one extreme to another, become chaotic, or collapse altogether. This has been a critical problem with climate change, because the signals take so long to propagate through the system. The lack of clear, measurable consequences makes it difficult for we relatively short-lived humans to feel motivated to respond, or to know how much of a response is really needed. And we won't get much feedback that our response is working, either. These signals will take decades, or maybe centuries, to return.

5. We can start having a real impact on a system at the level of information. By adding new feedback loops, we can accelerate and strengthen the signals, or interfere with information flowing through a system. This is the place where policy exerts its leverage. To be most effective, we should understand our purpose and design the loops to give the right signals at the right places and times. As the late Donella Meadows put it,

*"Reducing the gain around a positive loop—slowing the growth—is usually a more powerful leverage point in systems than strengthening negative loops, and much preferable to letting the positive loop run."* GHG emissions are a leverage point, because *"slowing them gives the many negative loops, through technology and markets and other forms of adaptation, time to function."*

4. The earth's climate obeys the natural and absolute rules of physics. We can't change those, but we can change the rules of our own invented systems to great effect. Currently, many rules, traditional practices, and government and economic policies around the world are interfering with feedback loops to such a degree that they

are weakening the system's ability to self-correct. For example, in countries in Asia and South America forests are still be burned to clear the way for farming and logging, sometimes at a cost of billions of dollars to other sectors.

3. Self-organization is the powerful, almost miraculous ability of a system to change itself in order to adapt. Creating a cap and trade system is a good example of this. Wherever possible, use the lower-level tools to adjust the system towards the goal, let the genius of the market adapt, and look to other cultures and other systems for different possibilities.

2. The goal of our economic system is growth. This goal is patently unsustainable over the long run. For some 200 years, economic growth and escalating carbon emissions have gone hand-in-hand, so there is no question that changing the goal has the potential to solve the problem of climate change in one fell swoop. Goals like this have been changed successfully in the past, even here in the US. A courageous individual stepped forward to announce a new vision, and almost instantly thousands, or millions, accepted the new goal and set about to make it happen. At the very least, we must begin a dialogue on what a stable and healthy economy might look like.

1. There is one final point of leverage more powerful even than changing the goal, and that is to change the beliefs out of which the goals, rules, and feedback loops arise.

- 10 Underlying assumptions and alternate beliefs, developed in collaboration with Jennifer White, Root Systems Institute.
- 11 Thomas Kuhn, *The Structure of Scientific Revolutions*, 2<sup>nd</sup> Ed., The University of Chicago Press, 1970.
- 12 Benjamin Lee Whorf, *Language, Thought, and Reality*, The MIT Press, 1956.
- 13 I have been unable to find the source of this quote, which inspired the ending to my essay: "The power of one - one thought, one action, one solution." It may have originated during the struggle against apartheid in South Africa, or may simply have emerged as an iconic sound bite from the movie *The Power of One*. The power of one concept was brought to my attention in a conversation on March 2, 2007, with Lorrie Vogel, General Manager of Considered Products, Nike.