

Thanks to the people on my e-mail list for all the suggestions (more than 100!) about my draft “Tell Barack Obama the Truth – the Whole Truth”. Most frequent criticism: the need for an executive summary. Two people suggested: put a summary in the form of a letter to Michelle and Barack Obama. I like that idea. They are equally smart lawyers, and if we can get either of them to really focus on the actions that are needed, the planet has a chance.

The letter turned out to be four pages. Sorry. But I wrote a note to John Holdren, which can serve as an executive summary. John has promised to deliver the letter, but cannot do so prior to the inauguration. That delay is a problem for one of the three recommendations: tax and dividend. Thus I am making the letter available at

[http://www.columbia.edu/~jeh1/mailings/20081229\\_DearMichelleAndBarack.pdf](http://www.columbia.edu/~jeh1/mailings/20081229_DearMichelleAndBarack.pdf)

and the revised “Tell Barack Obama the Truth” at

[http://www.columbia.edu/~jeh1/mailings/20081229\\_Obama\\_revised.pdf](http://www.columbia.edu/~jeh1/mailings/20081229_Obama_revised.pdf)

in hopes of getting the information to people who continue to push for “goals” and “caps”.

“Goals” for percentage CO<sub>2</sub> emission reductions and “cap & trade & dividend” are a threat to the planet, weak tea, not commensurate with the task of getting CO<sub>2</sub> back to 350 ppm and less. Note:

(1) There must be a tax at the mine or port of entry, the first sale of oil, gas and coal, so every direct and indirect use of the fuel is affected. Anything less means that the reduction of demand for the fuel will make it cheaper for some uses; e.g., people will start burning coal in their stoves. Peter Barnes’ idea to push the cap upstream to the extent possible is not adequate nor is a ‘gas tax’ suggested by NY Times and others. A comprehensive approach is needed.

(2) “Cap & trade & dividend” creates Wall Street millionaires and complex bureaucracy. The public is fed up with that – rightly so. A single carbon tax rate can be adjusted upward affecting all activities appropriately. With 100% dividend the public will allow a carbon price adequate to the job, i.e., helping us move to the post-fossil-fuel world.

(3) Supply ‘caps’ cannot yield a really big reduction because of the weapon: ‘shortages’. All a utility has to say is ‘blackout coming’ and politicians and public have to cave in – we are not going to have the lights turned out. Will the public allow a high enough tax rate? Yes, dividends will exceed tax for most people concerned about their bills.

(4) A tax is not sufficient. All other measures, such as building codes, are needed. But with millions of buildings, all construction codes and operations cannot be enforced. A rising carbon price provides effective enforcement.

(5) Wouldn’t it be cheaper to let people burn the dirtiest fuel? No. The clean future that we aim for, including more efficient energy use, is not more expensive. For example, you may have read about passively heated homes that require little energy and increase construction costs only several percent. Such possibilities remain the oddball (with high price tag), not the standard construction, unless the government adopts policies that make things happen.

Some of you suggested that I should only explain the urgency of the climate crisis, the need to get back to 350 ppm CO<sub>2</sub> and less. Politicians are happy if scientists provide information and then go away and shut up. But science and policy cannot be divorced. What I learned in the past few years is that politicians often adopt convenient policies that can be shown to be inconsistent with long-term success, given readily available scientific data and empirical information on policy impacts.

Jim Hansen

Dear John,

A few weeks ago in London, where Anniek was running after me from one meeting to another, she had a heart attack (fortunately we were near a very good hospital -- the problem should be permanently fixed via the stent they inserted plus a better diet). As we waited a week for her to be able to fly I wrote the attached letter to the Obamas. Could you possibly forward this letter to them?

I realize that it is a long letter (4 pages + a page of footnotes). But global warming likely will be, eventually, the problem of their lifetime. His presidency may be judged in good part on whether he was able to turn the tide -- more important, the futures of young people and other life will depend on that. So four pages may not be intolerably long.

My hope is that he (even better they) will want to understand the matter, not just rely on advisers. I refer not to the details of climate science, but rather what needs to be done. The danger is that the compromises and special interests inherent in Kyoto-style targets and cap-and-trade will be accepted because of bureaucratic momentum. Other intolerable aspects of current approaches are the escape hatches (plant a tree somewhere, reduce some other gas, etc.). Carbon dioxide is special because of its strange lifetime (eventually exceedingly long) and the fact that it acidifies the ocean. Also it needs to be recognized that forestation can not be traded for more fossil fuels because the forests are needed to help bring down the current amount of CO<sub>2</sub>.

The three points that I raise concern: (1) coal, (2) carbon tax, and (3) nuclear power.

(1) The critical need to cut off the coal source soon must be recognized. I was surprised that in 90 minutes I could not get the German Environmental Minister to understand that their proposed "carbon cap" would not allow them to build 20 more coal-fired power plants. I kept saying "if you burn more coal you must convince Russia to leave its oil in the ground" and he would say "we will tighten the carbon cap". Japan thinks that it did fine in meeting its Kyoto obligations, even though its coal use and CO<sub>2</sub> emissions increased. [Japan used Kyoto-allowed escape hatches. The Earth has no escape hatch.]

(2) A carbon tax (across all fossil fuels at their source) is essential, I believe, for effectiveness. Any less comprehensive cap will reduce the price of the fuel for any other uses.

A rising tax (with all the other needed measures such as building codes, vehicle efficiencies, renewable energies...) will help constrain demand for the fuel. When gasoline hits \$4-5/gallon again, most of that should be tax staying in the country and returned as dividend, providing the consumer the means to purchase more efficient products and incentive for entrepreneurs to develop them. A rising tax will help keep the price paid for the oil itself (or other fossil fuel) lower, thus making it unprofitable to go to the most extreme places on the planet to extract the last drop of oil. Instead we can move on sooner to the energies of the post-fossil-fuel-era.

A carbon cap that makes one more stinking millionaire on the backs of the public is going to infuriate the public. Me too. There is no need to support lobbyists, traders, and special interests. The tax should be proportional to the carbon amount and the dividend calculation will only require long division, which even a civil servant can do.

100% of the tax should go into the dividends. However, if some countries do not apply an equivalent tax, a duty should be collected on fossil-fuel dependent products imported from that country. Such import duties might be used, in part, to finance reforestation, climate adaptation, or other climate or energy related needs.

(3) Nuclear power: it would be great if energy efficiency, renewable energies, and an improved ("smart") electric grid could satisfy all energy needs. However, the future of our children should not rest on that gamble. The danger is that the minority of vehement anti-nuclear "environmentalists" could cause development of advanced safe nuclear power to be slowed such that utilities are forced to continue coal-burning in order to keep the lights on. That is a prescription for disaster.

There is no need for a decision to deploy nuclear power on a large scale. What is needed is rapid development of the potential, including prototypes, so that options are available. We have to avoid a "FutureGen" sort of drag-out. It seems to me that it is time to get fed-up with those people who think they can impose their will on everybody, and all the consequences that might imply for the planet, by putting this R&D on a slow boat to nowhere instead of on the fast-track that it deserves.

I hope that you will be willing to forward this to the Obamas. Wishing you the best for the holiday season, and especially success in your new job!

Best regards,

Jim Hansen

29 December 2008

Michelle and Barack Obama  
Chicago and Washington, D.C.  
United States of America

Dear Michelle and Barack,

We write to you as fellow parents concerned about the Earth that will be inherited by our children, grandchildren, and those yet to be born.

Barack has spoken of ‘a planet in peril’ and noted that actions needed to stem climate change have other merits. However, the nature of the chosen actions will be of crucial importance.

We apologize for the length of this letter. But your personal attention to these ‘details’ could make all the difference in what surely will be the most important matter of our times.

Jim has advised governments previously through regular channels. But urgency now dictates a personal appeal. Scientists at the forefront of climate research have seen a stream of new data in the past few years with startling implications for humanity and all life on Earth.

Yet the information that most needs to be communicated to you concerns the failure of policy approaches employed by nations most sincere and concerned about stabilizing climate. Policies being discussed in national and international circles now, which focus on ‘goals’ for emission reduction and ‘cap and trade’, have the same basic approach as the Kyoto Protocol. This approach is ineffectual and not commensurate with the climate threat. It could waste another decade, locking in disastrous consequences for our planet and humanity.

The enclosure, “Tell Barack Obama the Truth – the Whole Truth” was sent to colleagues for comments as we left for a trip to Europe. Their main suggestion was to add a summary of the specific recommendations, preferably in a cover letter sent to both of you.

There is a profound disconnect between actions that policy circles are considering and what the science demands for preservation of the planet. A stark scientific conclusion, that we must reduce greenhouse gases below present amounts to preserve nature and humanity, has become clear to the relevant experts. The validity of this statement could be verified by the National Academy of Sciences, which can deliver prompt authoritative reports in response to a Presidential request<sup>1</sup>. NAS was set up by President Lincoln for just such advisory purposes.

Science and policy cannot be divorced. It is still feasible to avert climate disasters, but only if policies are consistent with what science indicates to be required. Our three recommendations derive from the science, including logical inferences based on empirical information about the effectiveness or ineffectiveness of specific past policy approaches.

**(1) Moratorium and phase-out of coal plants that do not capture and store CO<sub>2</sub>.**

This is the sine qua non for solving the climate problem. Coal emissions must be phased out rapidly. Yes, it is a great challenge, but one with enormous side benefits.

Coal is responsible for as much atmospheric carbon dioxide as the other fossil fuels combined, and its reserves make coal even more important for the long run. Oil, the second greatest contributor to atmospheric carbon dioxide, is already substantially depleted, and it is impractical to capture carbon dioxide emitted by vehicles. But if coal emissions are phased out promptly, a range of actions including improved agricultural and forestry practices could bring the level of atmospheric carbon dioxide back down, out of the dangerous range.

As an example of coal's impact consider this: continued construction of coal-fired power plants will raise atmospheric carbon dioxide to a level at least approaching 500 ppm (parts per million). At that level, a conservative estimate for the number of species that would be exterminated (committed to extinction) is one million. The proportionate contribution of a single power plant operating 50 years and burning ~100 rail cars of coal per day (100 tons of coal per rail car) would be about 400 species! Coal plants are factories of death. It is no wonder that young people (and some not so young) are beginning to block new construction.

## **(2) Rising price on carbon emissions via a “carbon tax and 100% dividend”.**

A rising price on carbon emissions is the essential underlying support needed to make all other climate policies work. For example, improved building codes are essential, but full enforcement at all construction and operations is impractical. A rising carbon price is the one practical way to obtain compliance with codes designed to increase energy efficiency.

A rising carbon price is essential to “decarbonize” the economy, i.e., to move the nation toward the era beyond fossil fuels. The most effective way to achieve this is a carbon tax (on oil, gas, and coal) at the well-head or port of entry. The tax will then appropriately affect all products and activities that use fossil fuels. The public's near-term, mid-term, and long-term lifestyle choices will be affected by knowledge that the carbon tax rate will be rising.

The public will support the tax if it is returned to them, equal shares on a per capita basis (half shares for children up to a maximum of two child-shares per family), deposited monthly in bank accounts. No large bureaucracy is needed. A person reducing his carbon footprint more than average makes money. A person with large cars and a big house will pay a tax much higher than the dividend. Not one cent goes to Washington. No lobbyists will be supported. Unlike cap-and-trade, no millionaires would be made at the expense of the public.

The tax will spur innovation as entrepreneurs compete to develop and market low-carbon and no-carbon energies and products. The dividend puts money in the pockets of consumers, stimulating the economy, and providing the public a means to purchase the products.

A carbon tax is honest, clear and effective. It will increase energy prices, but low and middle income people, especially, will find ways to reduce carbon emissions so as to come out ahead. The rate of infrastructure replacement, thus economic activity, can be modulated by how fast the carbon tax rate increases. Effects will permeate society. Food requiring lots of carbon emissions to produce and transport will become more expensive and vice versa, encouraging support of nearby farms as opposed to imports from half way around the world.

The carbon tax has social benefits. It is progressive. It is useful to those most in need in hard times, providing them an opportunity for larger dividend than tax. It will encourage illegal immigrants to become legal, thus to obtain the dividend, and it will discourage illegal immigration because everybody pays the tax, but only legal citizens collect the dividend.

“Cap and trade” generates special interests, lobbyists, and trading schemes, yielding non productive millionaires, all at public expense. The public is fed up with such business. Tax with 100% dividend, in contrast, would spur our economy, while aiding the disadvantaged, the climate, and our national security.

### **(3) Urgent R&D on 4<sup>th</sup> generation nuclear power with international cooperation.**

Energy efficiency, renewable energies, and a “smart grid” deserve first priority in our effort to reduce carbon emissions. With a rising carbon price, renewable energy can perhaps handle all of our needs. However, most experts believe that making such *presumption* probably would leave us in 25 years with still a large contingent of coal-fired power plants worldwide. Such a result would be disastrous for the planet, humanity, and nature.

4<sup>th</sup> generation nuclear power (4<sup>th</sup> GNP) and coal-fired power plants with carbon capture and sequestration (CCS) at present are the best candidates to provide large baseload nearly carbon-free power (in case renewable energies cannot do the entire job). Predictable criticism of 4<sup>th</sup> GNP (and CCS) is: “it cannot be ready before 2030.” However, the time needed could be much abbreviated with a Presidential initiative and Congressional support. Moreover, improved (3<sup>rd</sup> generation) light water reactors are available for near-term needs.

In our opinion, 4<sup>th</sup> GNP<sup>ii</sup> deserves your strong support, because it has the potential to help solve past problems with nuclear power: nuclear waste, the need to mine for nuclear fuel, and release of radioactive material<sup>iii</sup>. Potential proliferation of nuclear material will always demand vigilance, but that will be true in any case, and our safety is best secured if the United States is involved in the technologies and helps define standards.

Existing nuclear reactors use less than 1% of the energy in uranium, leaving more than 99% in long-lived nuclear waste. 4<sup>th</sup> GNP can “burn” that waste, leaving a small volume of waste with a half-life of decades rather than thousands of years. Thus 4<sup>th</sup> GNP could help solve the nuclear waste problem, which must be dealt with in any case. Because of this, a portion of the \$25B that has been collected from utilities to deal with nuclear waste justifiably could be used to develop 4<sup>th</sup> generation reactors.

The principal issue with nuclear power, and other energy sources, is cost. Thus an R&D objective must be a modularized reactor design that is cost competitive with coal. Without such capability, it may be difficult to wean China and India from coal. But all developing countries have great incentives for clean energy and stable climate, and they will welcome technical cooperation aimed at rapid development of a reproducible safe nuclear reactor.

Potential for cooperation with developing countries is implied by interest South Korea has expressed in General Electric’s design for a small scale 4<sup>th</sup> GNP reactor. I do not have the expertise to advocate any specific project, and there are alternative approaches for 4<sup>th</sup> GNP (see enclosure). I am only suggesting that the assertion that 4<sup>th</sup> GNP technology cannot be ready until 2030 is not necessarily valid. Indeed, with a Presidential directive for the Nuclear Regulator Commission to give priority to the review process, it is possible that a prototype reactor could be constructed rapidly in the United States.

CCS also deserves R&D support. There is no such thing as clean coal at this time, and it is doubtful that we will ever be able to fully eliminate emissions of mercury, other heavy metals, and radioactive material in the mining and burning of coal. However, because of the enormous number of dirty coal-fired power plants in existence, the abundance of the fuel, and the fact that CCS technology could be used at biofuel-fired power plants to draw down atmospheric carbon dioxide, the technology deserves strong R&D support.

### **Summary**

An urgent<sup>iv</sup> geophysical fact has become clear. Burning all the fossil fuels will destroy the planet we know, Creation, the planet of stable climate in which civilization developed.

Of course it is unfair that everyone is looking to Barack to solve this problem (and other problems!), but they are. He alone has a fleeting opportunity to instigate fundamental change, and the ability to explain the need for it to the public.

Geophysical limits dictate the outline for what must be done<sup>v</sup>. Because of the long lifetime of carbon dioxide in the air, slowing the emissions cannot solve the problem. Instead a large part of the total fossil fuels must be left in the ground. In practice, that means coal.

The physics of the matter, together with empirical data, also define the need for a carbon tax. Alternatives such as emission reduction targets, cap and trade, cap and dividend, do not work, as proven by honest efforts of the ‘greenest’ countries to comply with the Kyoto Protocol:

- (1) Japan: accepted the strongest emission reduction targets, appropriately prides itself on having the most energy-efficient industry, and yet its use of coal has sharply increased, as have its total CO<sub>2</sub> emissions. Japan offset its increases with purchases of credits through the clean development mechanism in China, intended to reduce emissions there, but Chinese emissions increased rapidly.
- (2) Germany: subsidizes renewable energies heavily and accepts strong emission reduction targets, yet plans to build a large number of coal-fired power plants. They assert that they will have cap-and-trade, with a cap that reduces emissions by whatever amount is needed. But the physics tells us that if they continue to burn coal, no cap can solve the problem, because of the long carbon dioxide lifetime.
- (3) Other cases are described on my Columbia University web site, e.g., Switzerland finances construction of coal plants, Sweden builds them, and Australia exports coal and sets atmospheric carbon dioxide goals so large as to guarantee destruction of much of the life on the planet.

Indeed, ‘goals’ and ‘caps’ on carbon emissions are practically worthless, if coal emissions continue, because of the exceedingly long lifetime of carbon dioxide in the air. Nobody realistically expects that the large readily available pools of oil and gas will be left in the ground. Caps will not cause that to happen – caps only slow the rate at which the oil and gas are used. The only solution is to cut off the coal source (and unconventional fossil fuels).

Coal phase-out and transition to the post-fossil fuel era requires an increasing carbon price. A carbon tax at the wellhead or port of entry reduces all uses of a fuel. In contrast, a less comprehensive cap has the perverse effect of lowering the price of the fuel for other uses, undercutting clean energy sources.<sup>vi</sup> In contrast to the impracticality of all nations agreeing to caps, and the impossibility of enforcement, a carbon tax can readily be made near-global.<sup>vii</sup>

A Presidential directive for prompt investigation and proto-typing of advanced safe nuclear power is needed to cover the possibility that renewable energies cannot satisfy global energy needs. One of the greatest dangers the world faces is the possibility that a vocal minority of anti-nuclear activists could prevent phase-out of coal emissions.

The challenges today, including climate change, are great and urgent. Barack’s leadership is essential to explain to the world what is needed. The public, young and old, recognize the difficulties and will support the actions needed for a fundamental change of direction.

James and Anniek Hansen

Pennsylvania  
United States of America

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<sup>i</sup> Given the brilliant scientists Barack has appointed to his team, is there need for a National Academy of Sciences meeting? Yes, his team surely would welcome not only clarification of the urgency of the climate situation, but also interdisciplinary (economics, engineering, physics, biology...) discussion and evaluation of policy options. Barack's first year or two in office is almost surely our last best chance to get the climate and energy strategy right in time to save the future of our children and grandchildren.

<sup>ii</sup> I am **not** referring to the DOE's "Generation-4" nuclear program, which is a diffuse program that will not yield rapid payoff. Instead, as discussed below, there would need to be a Presidential directive to pursue a path(s) with the potential to contribute to decarbonization of global energy systems as rapidly as practical.

<sup>iii</sup> 4<sup>th</sup> generation reactors can include automatic shutdown in case of an earthquake or other interruption. It is noteworthy that, even with the presence of poorly designed nuclear power plants in the past, and in some cases demonstrably sloppy operations, the waste from coal-fired power plants has done far more damage, and even spread more radioactive material around the world than all nuclear power plants combined, including Chernobyl.

<sup>iv</sup> Urgency derives from the nearness of climate tipping points, beyond which climate dynamics will cause rapid changes out of humanity's control. Concern about such behavior derives not from theory or speculation, but from improving knowledge of how the Earth responded to past changes of atmospheric composition and from observations of ongoing changes.

Tipping points occur because of amplifying feedbacks. Feedbacks include loss of Arctic sea ice, melting glaciers and ice sheets, release of 'frozen' methane as tundra melts, and growth of vegetation on previously frozen land. The surface changes increase the amount of sunlight absorbed by Earth. Added methane reduces heat radiation to space, amplifying the warming effect of carbon dioxide produced by burning fossil fuels.

Analysis of Earth's history helps reveal the level of greenhouse gases needed to maintain a climate resembling the Holocene, Creation, the period of reasonably stable climate in which civilization developed. That carbon dioxide level, unsurprisingly in retrospect, is less than the current 385 ppm (parts per million). The safe amount for the long-term is no more than 350 ppm, probably less. Pre-industrial carbon dioxide amount was 280 ppm. Precise definition of a safe range requires better knowledge of all climate forcing mechanisms.

What is clear is that continuing fossil fuel emissions will put Earth on an inexorable course toward an ice-free state, a course punctuated by increasingly extreme disasters with hundreds of millions of climate refugees. A large fraction of species on Earth face certain extinction, if we burn most fossil fuels without capturing and storing the carbon dioxide. New species may come into being over many thousands of years, but all generations of our descendants that we can imagine will live on a far more desolate planet than the one we knew.

<sup>v</sup> Total carbon in conventional fossil fuels (oil, gas, and coal), if released to the air, is enough to initiate a dynamic transition to an ice-free climate state, a transition that would be out of humanity's control. A large fraction of the carbon dioxide emitted in burning fossil fuels stays in the air many centuries. Thus the climate problem cannot be solved by only slowing the rate at which we burn the fossil fuels.

Solution requires that a large part of total fossil fuels is left in the ground, or the carbon dioxide captured and stored. In addition, the unconventional fossil fuels (oil shale, tar sands, methane hydrates) must be left largely untouched or the carbon dioxide captured and stored.

<sup>vi</sup> Now, with oil prices down, is when a hefty carbon tax should be added. In the future, when the price of gasoline again reaches and passes \$4/gallon, most of this cost will be tax, staying in the country, spread among consumers, and driving our economy to a clean future. The public can understand this, if Barack explains it, and they will accept it, if there is 100% dividend.

<sup>vii</sup> A carbon tax requires agreement of only several major nations. If any given nation does not apply the tax, an equivalent duty can be applied to their products at ports of entry.