

Energy Policy and the Environmental Movement

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Global Research, November 06, 2009
[Axis of Logic](#) 3 November 2009

Theme: [Environment](#), [Oil and Energy](#)
In-depth Report: [Climate Change](#)

Two energy/environment phenomena are being widely discussed currently. These are global warming, and its mitigation, and the nuclear resurgence – the worldwide push to supply power with nuclear power plants. Careful study of these issues leads to the following conclusions:

1. Global warming is real and is causing harm.
2. Global warming is mostly due to heat production by human industry since the 1800s, from nuclear power and fossil fuels, better termed hydrocarbons, – coal, oil, natural gas. Greenhouse gases such as carbon dioxide (CO₂) play a minor role even though they are widely claimed the cause.
3. Both nuclear and hydrocarbon-based power must be eliminated to solve the global warming problem.
4. Nuclear power advocates have commandeered the global warming/greenhouse gas formula to promote nuclear power, based upon two errors: exaggerating the role of CO₂ on the one hand and incorrectly claiming that nuclear power plants do not produce CO₂ on the other hand.
5. Nuclear power can not be separated from nuclear weapons, which are essential to the consistent drive for American military domination of the world. This is the reason for nuclear power. Nuclear power does not make sense as a safe, efficient, or economical way to provide energy.
6. Solar and solar-derived (wind, wave) sources of power do not add heat to the environment and can be used to supply virtually unlimited electrical energy without causing global warming. If done properly they will open up new vistas of human freedom and cultural development. They also produce much less CO₂ than either nukes or hydrocarbons.

The rationale for these conclusions is given below.

Climate Science

We begin with a fact on which almost all agree; that the Earth's near-surface temperature has risen approximately 0.7 degree Centigrade since 1880. [1] Much evidence has been presented that human health and society are being damaged as a result. [2]

The science of global warming and the logic behind it has been widely publicized and understood both by proponents and detractors. It essentially is this, with details omitted for the sake of clarity:

In essence: energy comes in from the sun and, like an infrared heat lamp it is radiated out from the Earth as infrared long-wave radiation. This outward radiation is opposed by the greenhouse gases.

Since the beginning of the industrial revolution, hydrocarbon fuels have been burned in large quantities resulting in the release into the atmosphere of more greenhouse gases than before, particularly CO₂.

Global warming thus is thought to be harmful and due to the man-made addition of greenhouse gases and will be amenable to reduction of greenhouse gas emissions, particularly CO₂. Public policy, both technical and economic, research, and public discussion revolve around mitigation of CO₂.

A Different Climate Science

However, on careful reflection, it can be seen that there is a step that has been skipped; an unspoken omission that becomes an unconscious axiom and leads us to ignore an entire line of inquiry. This step-skipping is illogical.

That is, that with the advent of the industrial revolution not only is CO₂ generated by burning hydrocarbons, so is heat itself. Likewise with nuclear power, heat is released upon the transmutation (changing into other substances) of Uranium. In thinking about global climate change, one must calculate the heat added by nuclear reactors and hydrocarbon fuels. Energy (in this case in the form of heat) can not be destroyed, so says the first law of thermodynamics.

Therefore, in tallying the causes of global warming, this heat energy must be included, be it large or small.

It is argued though, that the amount of heat added by hydrocarbon and nuclear fuels is not enough to account for global warming. However, this must not be argued ahead of time (a priori), by which I mean: First you estimate the heat addition since the advent of the industrial revolution (e.g., 1880 - before which it was very small) then you compare that with an estimate of total Earth warming from the same year onward to determine whether it is enough.

These estimates have been made and with startling results. [3] [4]

By expressing the global warming in terms of energy, Nordell showed that the warming corresponds to a tiny amount of energy compared to solar radiation, specifically 62 hours (about 2½ days) of solar energy equivalent in the 120 years (about 44,000 days) from 1880-2000, or 0.005%. But even though 62 hours is such a small amount in 120 years, Nordell asserts that it is of the same order of magnitude as the total heat added by human use of hydrocarbons/nukes and accounts for 74% of global warming. He has a comprehensive and logical way of estimating both the total amount of global warming and the quantity of heat produced by nuclear and hydrocarbon use. Nickolaenko and Chaisson have presented similar concepts.[5] [6]

This has far-reaching implications - two schools of thought brought down by one idea.

Debunking Global Warming Denial

To begin- the easy one first:

Global warming denial- personified by Senator J. Inhofe of Oklahoma, USA, who had received, the last time I checked, \$847,000 from oil corporations, which have a stake in minimizing the importance of global warming since the focus of their opponents has been to emphasize the greenhouse gas, especially CO₂, emission from hydrocarbons. This is not proof of conscious wrongdoing as that would be an ad hominem argument (“argument against the man”) considered beyond the bounds of reason. However, to ignore it entirely would be the opposite logical fallacy- letting him slide without investigating this obvious conflict of interest.

How was global warming denial brought down? By pointing out that some global warming must occur with added heat -as noted above, energy can never be destroyed. Some is dissipated through the Earth’s land, water (including ice) and air. Some is radiated out, like turning up the setting on a heat lamp, but not enough to eliminate all the extra heat. The estimates cited above, and that have not been refuted by opposing scholars, additionally demonstrate that it is a significant amount of global warming.

To go further, as stated by Georgescu-Roegen in 1975: “...solar energy, on the other hand, has a unique and incommensurable advantage. The use of any terrestrial energy produces some noxious pollution, which, moreover, is irreducible and hence cumulative, be it in the form of thermal pollution alone. By contrast, any use of solar energy is pollution-free. For, whether this energy is used or not, it’s ultimate fate is the same, namely, to become the dissipated heat that maintains the thermodynamic equilibrium between the globe and outer space at a propitious temperature.” [7]

In other words, solar energy is coming in; it is up to us to figure out how to use it. Whether we use it or not, it will not add extra heat to the Earth as will hydrocarbons and nukes. However, if we persist in using heat-adding sources of energy, we will worsen global warming.

Debunking Greenhouse Gas Primacy

Secondly - the global warming establishment. The administrative/scientific arm is “official”. It is called IPCC, The Intergovernmental Panel on Climate Change. It has the usual trappings: a multitude of reports, both lengthy and repetitious, an army of bureaucrat-academics and publicists with high-sounding titles. This is the publicity power center and the source of public announcements of the policy noted above: Public policy, both technical and economic, research, and public discussion revolve around mitigation of CO₂.

Perhaps they are best personified by former U.S. Vice President Gore, more recently, Nobelist Gore, for this work in his well-known film. Gore skirts a few issues and did not bring up the ticklish subject of the distribution of wealth and how that might affect both total CO₂ production and CO₂ production by and for the wealthy few, which would include not only their lavish, really pharaonic, lifestyles, but also the military use of hydrocarbons; much valuable information on this has been rounded up by Barry Sanders. [8] For example, the U.S. Department of Defense is the largest consumer of energy in the world, having used one quadrillion Btu (that’s a 1 with 15 zeros) during fiscal 2006.

Despite its establishment imprimatur, the IPCC and its enthronement are beset by contradictions and difficulties, both scientific and political, in addition to the two already

discussed.

CO₂ is relatively weak as a greenhouse gas. The strongest natural greenhouse gas is water vapor. This has actually been known since 1861. [9] There is much more of it in the air than there is CO₂ and it is intrinsically more capable of holding in heat than CO₂ is. However, water vapor magnifies whatever effect CO₂ has and increases in the atmosphere as the temperature goes up. CO₂ also rises in the atmosphere in response to warming as well as being a cause.

CO₂, if eliminated entirely would leave 88% of the greenhouse effect, according to Ramanathan and Coakley.[10] Some estimates for the CO₂ effect are smaller still, estimating that water vapor accounts for 95-98% of the greenhouse effect. [11] [12] So if greenhouse gases, as calculated by Nordell, account for less than or equal to 26% of the greenhouse effect and CO₂ only 12% of that, at the most, the very most that CO₂ abatement could do would be to reduce global warming by 3%. Thus, it is hard to see how this would be a significant effect. On the other hand, I have not proven that it is insignificant. Heat, water vapor, and CO₂ may form positive feedback loops, each increasing the effects of the other two. At the same time it is important to remember that water vapor is the important atmospheric carrier of heat.

Modeling of the climate is even more complicated because of the effects of water vapor as clouds, which may cause heating or cooling in various situations. [13] There is also the problem of other greenhouse gases, such as methane, which may be released from thawing permafrost. An exhaustive account is beyond the goals of this paper.

And we have IPCC's further problems to examine. A stark fact to immediately consider: A good example of "continuity of government" is that both the Bush and Obama regimes made it clear that they have no intention of complying with the Kyoto agreement to reduce CO₂ emissions to 1990 levels by 2012. [14] [15] Nor have they done anything substantive on fuel conservation through enforcing easily achievable high gas mileage for cars.

The IPCC revises its climate model often and this should not be at all startling given the way that science works in general and the complexity and chaos of the climate in particular. Not surprisingly, no predictive value has been shown for the models.

Nevertheless, they and their allies get huffy if alternative theories to the CO₂/greenhouse theory, such as primary thermal production, as outlined above, solar cycles, etc. are discussed. [16] [17] Their approach gives off an odor of "appeal to authority" the logical fallacy called *argumentum ad verecundiam* by logicians. More reason to examine them closely.

Besides its vast establishment authority, the IPCC has strange and not-so-strange bedfellows. Nuclear scientists are front and center attacking alternative theories. As noted above, nuclear power is being widely discussed in this season and we unfortunately appear to be at the beginning of a planned nuclear resurgence. Global warming has been worked nicely into the public relations campaign for nuclear power.

For that to work at all, no quarter can be given to alternate theories such as those discussed above. If primary heat production is the cause of global warming, nukes are out, not just hydrocarbons.

They have further problems. Their scientific edifice is based on two "half-truths" or untruths. We have discussed the first already: the rationale for greenhouse gas/CO₂ hegemony is

tenuous.

Here's where they and their helpers tell a real whopper, in rationale No. 2: Nuclear power has zero carbon/CO2 emissions. [18] [19] It's magnificent, breathtaking. "Make the lie big, make it simple, keep saying it, and eventually they will believe it," former German Chancellor Adolf Hitler.

Nothing has a zero CO2 footprint, even solar and solar-derived energy systems, although these have very small ones, and smaller than those of nuclear power plants. Here is the nuclear publicists' kernel of truth: In the near and medium term nuclear power has a smaller CO2 footprint than hydrocarbons do with a wide range of estimates, from 8-50% of the latter. The obligatory CO2 production occurs at a large number of points along the nuclear reactor cycle(s), too many to comfortably read in text. See Table for specifics on CO2 and CFCs (chlorofluorocarbons - man made greenhouse gases) in the nuclear cycle.

There is another subtlety that must be considered in evaluating the CO2 footprint- the efficiencies of nuclear power and hydrocarbon power.

What is "efficiency"?

When we produce, purchase, or consume energy we care about electricity, not energy in general. What we actually get is heat. The % of total heat energy that we can turn into electricity is the efficiency. (This does not apply to the internal combustion portion of our energy usage.)

For nuclear power plants it is about 33%. That means that for every kilowatt hour of electricity produced, there are two kilowatt hours immediately wasted as heat. Hydrocarbon-based power plants are more efficient - 41-60%. [20] [21]

These facts bear upon our interpretation of the CO2 footprint. It needs to be estimated not in thermal (same as total) kilowatt hours but in kilowatt hours of electricity, that part of the energy produced that is actually used.

Since nukes are less efficient, the advantage of a smaller CO2 footprint is proportionally reduced.

A truly ugly aspect to ponder is the long-term CO2 footprint of nukes. The sequelae of nuclear power and nuclear weapons (the two are inseparable) are eternal. There is, I believe, no better way to put it. It is difficult for the human mind to grasp long time periods. It doesn't matter if you tell me it is 100,000 years or 100,000,000. It is forever. It will require continuous stewardship and security forever - permanent labor peonage for our descendants. I find that profoundly more disturbing than the accompanying obligatory CO2 production.

Nevertheless, the CO2 cost is infinite, since the job goes on forever.

The following table shows how nuclear power plants produce CO2 and use CFCs.

Table

Nuclear Power Plant/Nuclear Fuel Cycle and Greenhouse Gas Emissions

1

Mining (using diesel powered heavy machinery)

2

Transport to mill

3

Milling (rock crushed to powder, treated with sulphuric acid)

4

Depleted ore washed with lime (lime made by heating limestone with fossil fuels releasing CO₂)

5

Resulting slurry pumped to tailing ponds

6

Tailing ponds maintained with diesel powered machinery

7

Uranium dissolved in kerosene to form Ammonium diuranate, or “yellowcake”

8

The yellowcake is roasted at 800°C, 1472 Deg F, in an oil-fired furnace called a calciner, converting it to 98% pure Uranium oxide

9

The Uranium oxide is packed into 44 gallon [UK] drums and transported to a shipping port; the drums are then shipped, often half way around the world

10

The Uranium oxide is dissolved in Hydrofluoric Acid and excess Fluorine gas to form Uranium hexafluoride gas

11

Uranium hexafluoride gas is then compressed and transported in cylinders to be enriched – centrifuges used require electricity, generally supplied by coal-powered plants in the U.S. Building the centrifuge cascades requires fossil fuels for mining and refining materials, transport and construction

12

Uranium hexafluoride gas is then transported to the fuel fabrication plant

13

The Uranium hexafluoride gas is converted to Uranium dioxide powder and pressed into pellets. They are then baked in an oil-fired furnace to form a ceramic material. The pellets are then loaded into the fuel rod - a tube made of a zirconium alloy. For every ton of Uranium in the fuel, up to 2 tons of Zirconium alloy are needed for the tubes.

14

Reactor construction requires large amounts of cement and steel, production of which releases a large amount of CO₂

15

Uranium enrichment plants require CFCs for normal operation (cooling) of centrifuges

16

The reactor uses coal electricity in the US, as well as producing it.

17

Worker transport required to operate power plants

18

Recovered Plutonium and mixtures of Plutonium and Uranium oxides (MOX) are sent by road back to the fuel fabrication facility to be used in new fuel rods.

19

Plant decommissioning

20

Permanent security needs - by land, sea and air

21

In the paper "Nuclear Power : the energy balance" by J.W. Storm van Leeuwen and P. Smith (2005) the authors calculate that with high quality ores, the CO₂ produced by the full nuclear life cycle is about one third to one half of an equivalent sized gas-fired power station. For low quality ores (less than 0.02% of U₃O₈ per tonne of ore), the CO₂ produced by the full nuclear life cycle is EQUAL TO that produced by the equivalent gas-fired power station.

Through the smoke and mirrors, we see the dance of the nukes vs. hydrocarbons, but both Sen. Inhofe and Vice President Gore are nuclear proponents. In Gore's case it goes back to his daddy, who was well-connected to hydrocarbon and nuclear capitalism.

Let's approach this another way, through the history of nuclear power. Everything was humming along nicely until the Chernobyl and Three Mile Island disasters and political defeats by popular movements in Oklahoma and The Philippines. Nuclear power expansion was brought to a standstill. Anti-nuclear power advocacy was unquestioned as a part of the environmental movement and broader social movements.

However, nuclear power is a non-negotiable requirement for America's rulers. Why? Because of the intimate union of nuclear weapons and nuclear power. Military and political considerations dominate this decision, rather than pure economics. The goal is and has been to promote, develop and maintain American military hegemony, global "full spectrum dominance", historically tied to nuclear weapons since the Manhattan Project of the early 1940s. So it doesn't matter that nuclear power makes no sense from any other point of view: health, safety, potential and actual disaster, economics. It is locked in.

A strategy was developed. The first step was patience. Radical promotion of nuclear power immediately after the problems mentioned above would have been self-defeating.

Multi-pronged approach for 25-30 years:

Using scientific public relations, find ways to sanitize nukes and ways to keep bad news far from the public eye, muddy the waters on the clear-cut and multi-generational proof of increased morbidity and mortality from nukes, etc. [22] [23] [24] [25] [26]

Don't announce accidental releases of radioactive materials. [27] Humans are not able to perceive radiation with our five senses. Thus there is no way for the public to be aware of radiation poisoning, except if informed or numerous people get and use radiation counters. By the same token, the damage is silent and cumulative. For example, the fact that the incubation period for cancer is anywhere from one (in the case of childhood cancer) to 50 or more years after the initial insult makes it easier to obscure the role of radiation and other environmental initiators of cancer.

Thirty years went by and the nuclear people are ready. They have mobilized some strange bedfellows. Many environmentalists, including such luminaries as James Lovelock, Stewart Brand, Jared Diamond, and George Monbiot, have moved or been moved from anti-nuclear to pro-nuclear. The terms "alternative" and "sustainable" are being used to describe nuclear power. [28] [29] The rationale given by environmentalists is that global warming is an impending civilization-ending cataclysm so that we have no other choice; nukes are required as a temporary stop-gap measure.

Leftists and socialists have more or less joined in, embarrassingly buying the IPCC theories without a critical glance. [30] [31] If anything they feel that IPCC is stodgy and "go slow" about their own conclusions. They use that same "appeal to authority" fallacy; in this case, the variant known as appeal to (elite) consensus. Look what happened when "we" went by the word of that rustic slave-holder, Aristotle, that the Sun goes around the Earth. It took Europeans 2000 years to get over that one.

Without saying so or perhaps even being aware, they assume the science of global warming

and its interpretation by and reportage by IPCC is non-ideological, is objective. This is quite a leap of faith and the opposite of the critical approach recommended by socialist theory. [32]

With regard to nuclear power they may be against it in a perfunctory sense, for example, giving a few spots on their websites and publications to anti-nuclear views, without integrating the nuclear question into their general approach. [33] It is the ghettoization of the anti-nuclear advocates and their point of view. [34] They miss something important and with political ramifications: Nuclear weapons and nuclear power and political power can never be separated.

This latter reality has foreign policy implications for all nations. There is a worldwide push to sell and build nuclear power plants right now, a state-backed money-maker for a few insiders. At the same time, there has been in recent months an Obama-backed public relations campaign for nuclear disarmament. It sounds good but is meaningless because nuclear power and various nuclear and other weapons programs and radiation wars will continue, even if large thermonuclear weapons are eliminated.

The ramifications are there for leaders of all countries, who are aware of the danger of getting into America's gunsights, given the U.S.' consistently bellicose behavior, even if American liberals are not. They see that North Korea (DPRK) and Iran have countered America with local military parity. For their countries' survival they must get good weapons and a nuclear start; with power plants, a toe in the door. These arms races and related nuclear power races are lucrative for the few.

Capitalism, Ecology, and CO2

There are also socially destructive implications for a capitalist approach to CO2 abatement, for example, the capitalist-bureaucrat "cap and trade" "industry". This is open to all sorts of manipulation. A case in point: nuclear people would like to see a carbon tax for the explicit purpose of making nuclear power more economically competitive. ²⁰In general, this "industry" has all the charm, elegance and utility of a traveling carnival. There is no evidence that it will reduce greenhouse gas emissions or produce anything useful. Such an institution can be counted upon to prolong its own existence and this in itself may encourage it to be slow in greenhouse gas abatement.

CO2 sequestration technologic fixes are being promoted as part of this green capitalism. At the same time not enough attention has been given to the Earth's carbon/CO2 cycle. The mass media discuss CO2 abatement strictly in terms of hydrocarbon use. The total cycle and the CO2 sink are rarely mentioned.

Much more CO2 is in the ocean and on land than in the air. The CO2 sink consists of the ocean (about $\frac{3}{4}$) especially the ocean south of the Indian subcontinent, and the land (about $\frac{1}{4}$). Through photosynthesis, the CO2 is utilized, turned into carbohydrate, e.g. cellulose, glucose. There are also inorganic processes that incorporate CO2 into minerals. On land the forests are most important.

The CO2 sink has degraded and is less able to incorporate CO2 than formerly.

In the ocean due to factors such as these: radioactive contamination reducing living populations, prior warming and acidification of the ocean rendering CO2 less soluble, and an ozone hole over the south ocean; the latter thought to be due to CFC gases. [35] [36] [37]

These CFCs are required coolants for a key part of the nuclear fuel cycle.

The rain forests are a huge sink, but are being clear cut and burned at the rate of tens of thousands of square miles per year. Fewer people are aware of the northern (boreal) forest and its problems. Indigenous lands in what is more often referred to as the Canadian Province of Alberta are undergoing the largest engineering project in history [38] [39] A huge forest has been and is being stripped off our Mother Earth, and below the trees, gouging out the dirt itself in huge chunks visible from outer space, to get the oil. It has been termed a gigantic slow motion oil spill. The extraction itself is energy intensive and CO2 emitting. A further irony – there are plans to power this extraction using nuclear energy, to reduce the CO2 footprint! [40]

It is a double whammy on the carbon/CO2 sink. Burning forests with their stored carbohydrate releases CO2. Simultaneously, there is less live plant life to incorporate CO2 through photosynthesis, at least temporarily.

North or south, this is all for short-term profits for corporations with a global reach. Where are the plans to mitigate this craziness?

Nuclear Dreams

We will have better luck investigating the wet dreams of the nuclear people. They have a desire to build Plutonium breeder reactors and their associated reactor core reprocessing plants. [41] Current light water reactors cause fission (the energy-producing reaction) of only 0.5% of the Uranium. The nuclear plants of which they dream would raise that, ideally, up to 70% (the text does not explicitly state whether or not it is Plutonium, Uranium, or a mixture); 140 times greater energy yield. They project forward to 2050, with nine billion people and each having an energy demand, on average, 150% of what we demand currently. They look to nuclear power to supply over 50% of energy needs in 2050. [19]

Think of the other kind of power, and wealth, that this represents. This can cloud many men's minds, drive them to commit many crimes, and it has. Fortunately, the scenario imagined above is strictly hallucinatory. But let us imagine it taking place and the heat burden it would produce, following Professor Nordell's line of reasoning. It would be much worse than current global warming trends.

False Choice

Today the global public is faced with a false choice, profitable for a few for a while, between nukes and hydrocarbons. The important, the "real" distinction is no-added-heat (solar and solar-derived: wind, wave, etc.) v added-heat (nukes and hydrocarbons).

In addition to adding heat, nukes and hydrocarbons have several other features in common. These materials and technologies lend themselves to easy monopolization and require a hierarchical corporate structure with an emphasis on security in order to carry out a complex series of events to make that energy usable. Because of these features, they are both labor and capital intensive.

On the other hand the global public majority has no control over the production and distribution of energy of this type. It is an enforced scarcity.

They cause untold misery in terms of illness and early death. [42] One Alberta doctor noted

a high number of cases of the usually rare cancer, cholangiocarcinoma, likely due to the hydrocarbons and/or other materials needed for hydrocarbon extraction, in the project discussed above.

Solar and Solar-derived Energy

Solar and solar-derived need not have any of the above-cited drawbacks. Until very recently, we were told that solar wasn't "ready". Now we are told that solar, wind, and wave are "not enough". Really? It's time to splash our faces with cold water. Girls and boys, let us take off our blinders. Father Sun sends us 122 Petawatts per year (equivalent to 122 million American-sized nuclear power plants). Our puny industries produce only 0.005% as much. I think 6.7 billion people can figure out how to optimally use this excessively generous gift, don't you?

The science and engineering of solar/solar derived systems have advanced despite active hostility from the U.S. government, such that the price of photovoltaics has collapsed one-thousand-fold in forty years, only one of many examples. Very little government research money has gone, over the decades, to solar/solar-derived compared to nukes/hydrocarbons, the taxpayer subsidizing the energy corporations. [43]

Nevertheless, the energy capitalists have designs on solar and wind power also. They envision centralized facilities and huge grids at taxpayer expense with a hierarchical corporate structure.

But we do not have to settle for that. Nowadays there are small solar, small wind, and a wide variety of systems. There are also storage systems for solar energy despite continuing assertions to the contrary.

Psychological, Social, Economic and Political Conclusions

The type of technology we have determines much about our culture and even our inner thoughts and feelings. Thus we should determine what type of technology we develop based upon our understanding of our purpose and need. Ideally, our needs should be filled with as a low a labor and capital input as possible. If solar/wind are cheap and easy, which they will be, why should we spend more time laboring in a labor-intensive, dirty, dangerous industry and spend more time laboring to purchase (as rate-payer &/or tax-payer) expensive capital equipment and supplies that go up in radiation and smoke.

We can have a shorter work week and get on to further pressing problems.

We have serious problems to solve. The excesses of the industrial/nuclear era have resulted in, in many ways, degradation of our physical beings and that of our Mother Earth. Untangling this will be a challenging project for 21st Century humanity. See footnote 34 for just one example.

Although many will agree on the utility of the approach I suggest here, it is not compatible with a capitalist system or logic. Capitalism requires that the labor of the many (the more, the better; and continually increasing) becomes the wealth of the few - not compatible with low labor and capital inputs. To make it happen will require tenacious political struggle.

Finally, for those unconvinced of the role of primary heat production in causing global warming and agreeing with the IPCC assessment that greenhouse gases are the most

important factor, the solution proposed here is the better one. It is shown here that for CO₂ and other greenhouse gases, nukes add a significant burden beyond that caused by hydrocarbons alone, and in comparison with solar/solar-derived power. Thus eliminating hydrocarbons and nukes will solve the problem more quickly than only eliminating hydrocarbons.

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