# GLOBAL ISSUES

## THE POLITICS OF GLOBAL WARMING: SCIEMOCRACY AND THE RESCUE OF THE KOBAYASHI MARU

**Donald V. Kurtz and Manuel Fustes**

*The 2014 Intergovernmental Panel on Climate Change argues that the world's governments must act now to mitigate the imminent and existential threat of global warming and avert an environmental catastrophe. The report suggests that mitigation technologies are known and available. Yet the report is skeptical of the qualifications and capabilities of the world's politicians to develop and implement the required mitigation. This paper proposes the framework for a sciemocracy, a global, scientific political organization dedicated exclusively to mitigating the threat of global warming. The sciemocracy is framed against the background of our current modernity, a paradigm and metaphorical 'box' that provides the scientific resources for mitigation as well as the socio-cultural impediments to mitigation. This paper argues that in order to accomplish necessary mitigation we must think outside the modernity 'box' and engage a creative and robust politics.*

***Keywords:*** *global warming, IPCC, politics, modernity, energy, fossil fuels, government, sciemocracy.*

> I don't know if science can save us. What I do know is that the absence of science will kill us.
>
> Neil deGrasse Tyson (2014)

### Introduction

The Intergovernmental Panel on Climate Change (2014, IPCC hereafter) argues convincingly that global warming[1] represents an imminent existential threat to the survival of humankind and its civilizations. In a previous paper we (Kurtz and Fustes 2014) analyzed the historical linkages between the major factors that contribute to global warming: photosynthetic global energy balance, fossil fuel consumption, and population. In this paper we suggest the framework for a sciemocracy, a political institution designed exclusively to provide the governance necessary to mitigate global warming and forestall an imminent world-wide disaster. The framework for the sciemocracy consists of a structure of political offices vested with powers that may be accessed by their incumbents and used to mitigate global warming.[2] The precise composition of this framework will develop, as with any government agency, over time through the responses of its incumbents to the problems they confront. The presumption upon which the sciemocracy rests is based on two propositions we shall develop later: 1) the socio-cultural and political mechanisms to mitigate global warming do not exist; 2) the politicians that consti-

tute the world's governments are neither capable of nor qualified to develop those mechanisms.

The politics of global warming involves the competitive engagement of the power of the sciemocracy and the power of science skeptics and Merchants of Doubt in the employ of special interests and big energy cartels (Orestes and Conway 2011). The latter's goal is to debunk falsely the science related to global warming and thwart its mitigation through purposefully misleading statements and demagogic practices.[3] The energy interests that rely on the science skeptics easily could tip this competition into a no-win situation; everyone, including the skeptics, loses in this event. Avoiding a no-win contest will require a politics by the sciemocracy that has not yet materialized but was suggested in a science fiction context.

One incident in the Star Trek series, the rescue of the Kobayashi Maru, related a conundrum not unlike that to which the sciemocracy will have to respond in its political confrontations with special interests opposed to mitigation: how to win a 'no-win' situation. The Kobayashi Maru, a metaphor for planet earth, is a disabled space freighter with a full crew adrift in hostile galactic territory. How to rescue the Kobayashi Maru is a simulated training exercise designed to interrogate the character, abilities, and reaction of cadets, potential commanders in the Starfleet Academy, to a no-win situation.[4] Any attempt by another ship and crew to enter that hostile territory and rescue the Kobayashi Maru and its crew would cause an incident with Klingon interstellar military forces and result in the destruction of the Kobayashi Maru, the rescue ship, and both crews. But failure to rescue the Kobayashi Maru also ensures its destruction and death of its crew.

As we shall see later the solution to this conundrum was elusive. But it was timeless, as pertinent to the unnamed era in which Star Trek existed as it is to the 'modernity' that presently envelops most of the nations on earth and the global warming they all confront. Now, as it was in the fictional Star Trek scenario, it is imperative that someone think outside the box and act creatively to repudiate the deceit, humbuggery, treasons, lies, and collusive strategies science skeptics and Merchants of Doubt rely on to obstruct mitigation.

**Modernity**

Modernity may not appear to be relevant to the issue of global warming. But the modernity characteristic of the world's developed nations currently provides, on the one hand, the power and cultural space within which mitigations must develop and, on the other, the power and cultural space that impedes mitigation. Our present modernity is a construction of dialectical political, economic, social, and cultural conditions that emerged in the Renaissance and gradually coalesced with scientific explanations for how and why almost everything that affects human beings works.

We think of modernity as a scientific paradigmatic domain that embodies 'particular ontological assumptions ... epistemological foundations (and) theoretical principles, from which ... specific testable theories are derived' and replaced as better explanations emerge (Lett 1987: 32; Kuhn 1970). Modernity understood as a paradigmatic domain encompasses the origins, characteristics, explanatory propositions, and scientific revolutions that, as noted above, were instrumental in creating the world's current civilizations over the last several centuries.

We argue that science was the most important modernity factor invigorated by the Renaissance. Despite contributions to modernity by those who developed its attendant

sociocultural features it was scientists who invented the technologies inseminated by fossil fuels that birthed the world's current civilizations. The idea of modernity or some as yet to be defined equivalent is relevant to the civilizations we inhabit and may be so in the future if global warming is mitigated successfully.

Greenblatt (2011) makes a compelling argument that the humanistic 'narrative' of modernity began its 'swerve' from the pre-modern *Deus vult* (God wills it) of the Catholic Church during the Renaissance around 1417. That was the year a book, *De rerum natura (On the Nature of Things)*, written by Titus Lucretius Carus about 50 BCE was discovered by Poggio Bracciolini, an itinerant book-hunter, in the library of a German monastery. Without knowing it once Poggio ordered his scribe to copy *On the Nature of Things* its ensuing publications presaged the foundation of modernity and concluded the pre-modern era of western civilization.

Just as Peter Higgs postulated in 1964 the invisible particles that hold the universe together, the Higgs boson, Lucretius in 50 BCE postulated the invisible stuff of which the universe is composed: *atoms*. According to Lucretius, atoms were unpredictable, invisible particles that moved through space randomly in what he referred to as a *swerve.* Many of core arguments in *On the Nature of Things* are among the foundations on which modernity, however conceptualized, has been constructed.

Lucretius postulated that the universe and all matter were composed of atoms which, through their swerves and collisions, constantly brought into being and then reconstituted everything by which the universe and its elements were created, human beings included. Lucretius rejected the notion of a divine creator. Everything that existed according to Lucretius was the result of trial and error created by the random swerves of atoms. Successes survived. Failures did not. Once Lucretius's ideas were rediscovered they could not be suppressed, even though the Catholic Church vigorously attempted to do so.

Following the publication of Lucretius's ideas in the late fifteenth, early sixteenth centuries its presumptions influenced a pedigree of notable idealist and materialist thinkers up to the present (Greenblatt 2011: 242ff). Gradually the ideas derived from *On the Nature of Things* induced a swerve in human thought, explanation, and practice that replaced the medieval pre-modern irrationalities of *Deus vult* with the scientific rationality that remains a keystone of modernity. Today science provides the fulcrum the sciemocracy must leverage to accomplish the mitigation necessary to avert a global warming induced catastrophe.

From one anthropological perspective the modernity paradigm is commensurate with the present and ultimate phase of that evolution of social organization that was spawned by the technological capture of energy from fossil fuels. That was the environment in which Lucretius's scientific suppositions began to unfold dramatically. At the core of the modernity paradigm is a doctrine of scientific progress that for us – the authors – is devoid of any implication of cultural or ethnic superiority. Instead the scientific modernity birthed by the progress doctrine is reflected in the evolution of social organizations composed of populations that increasingly live in cities, participate in big differentiated, specialized, tightly structured institutions (see Fig. 1) constituted of socially stratified role players from peasants to kings, the impoverished to the one-percent. Today these attributes are assimilated in variations of capitalist economies subject to laws and policies enacted by incumbents elected to bureaucratic offices embed-

ded in 'liberal' governments modeled (often in form only) after those encased in western state formations.

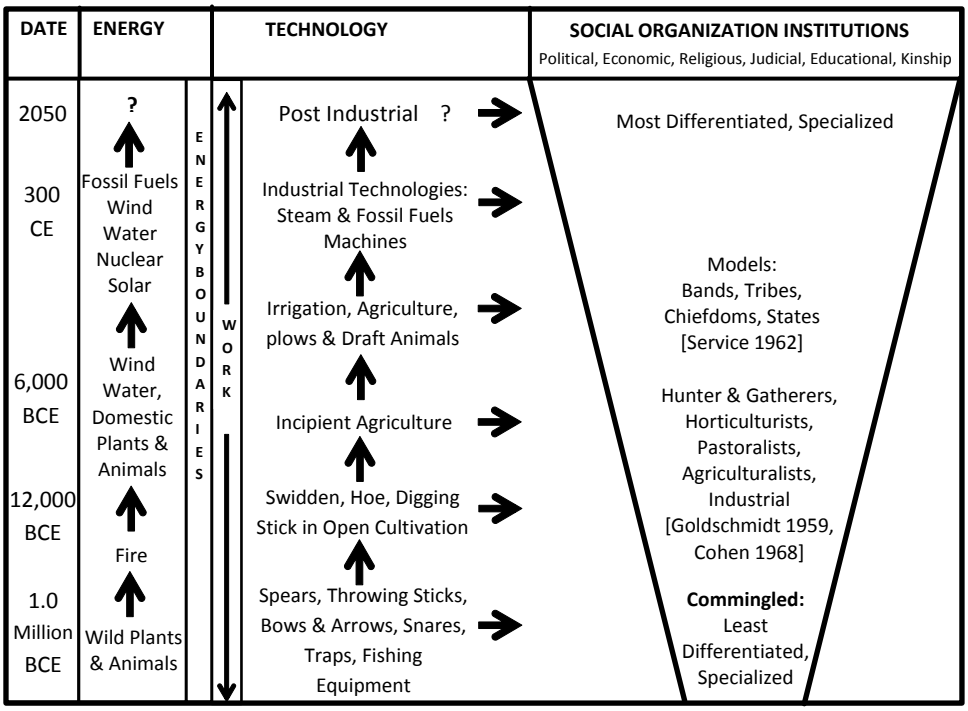


**Fig. 1. Evolution of social organization**

*Source*: Kurtz and Fustes 2014.

Without the influence of Lucretius's swerve it is hard to imagine the industrial revolution, its myriad discoveries, subsequent inventions, and the science that provided material and ideational visions of the world that were not grounded in theology. The free will embodied in Descartes's 'Cogito ergo sum' (I think, therefore I am), the model for modern government (Rousseau's 'On the Social Contract'), Newton's calculus, Darwin's evolution, Einstein's relativity, and Hawking's timeless genius could not have emerged under a hierarchy dedicated by *Deus vult* to the divine right of kings.

The modernity paradigm has not been divorced totally from *Deus vult* ideologies. Most conservative religiose, Christians, Muslims, and Jews, among others, and science skeptics do not believe that their futures are subject to the rules of nature or physics (Callison 2014). The religiose believe that their futures are the responsibility of culturally invented pantheons specific to their cultural spaces. Neoliberal politicians and their supporters (often evangelicals) complement *Deus vult* sensibilities with an abhorrence of government and postulate an equally phantasmic *Mercatus vult* (the market wills it)[5] solution to global warming. It is ironic that in those societies (*e.g.*, Iran and the United States) where so much of the people's culture is a product of science that belief in the power of divine intervention is so influential. This is testimony to the persistence of *Deus vult* principles in the modernity paradigm that thinkers such as Lucretius helped to

enjoin. Today we need a climate swerve (Lifton 2014) to deflect the unimaginable catastrophe that an unmitigated global warming poses for humankind and its civilizations.

**Background to Global Warming**

The 2014 IPCC (2014a) report is the most recent of several previous IPCC reports. It provides the epistemological foundation from which we may extrapolate data to inform us how to mitigate global warming before it extinguishes life as we know it. The report warns of dire consequences for humankind if something is not done *now* to mitigate global warming.[6] There are remarkable levels of agreement and continuity among the writers of the report that summarize tersely the salient characteristics of the anthropocene age we inhabit:

> Global warming is here. Global warming is real. Global warming is caused by human interventions. Global warming may already be irreversible. Global warming may be the existential catastrophe that destroys utterly human populations and their civilizations.

The IPCC report is cautiously optimistic. It suggests that if we act now we can mitigate global warming without interrupting how the world's nations continue business as usual. Science skeptics dismiss these conclusions. Other scientists offer more nuanced alternatives to the IPPC's predictions. For example, Klimenko and Tereshin (2010) rely on a variety elegant models[7] and graphics to test and corroborate IPCC projections regarding the future of fossil fuel consumption and availability. Presumptions they draw from these strategies enable them to conclude that 'the anthropogenic emission of $CO_2$ will ... within the next quarter century reach its maximum' (Klimenko and Tereshin 2010: 29) and that 'the key role of fossil fuels (in the world's energy balance) will hold up at least (through) 2060–2065' (*Ibid*.: 29, 33, parentheses added).

The value of any postulation is only as good as the data that supports it. Among other factors (energetic, historical, climatic) Klimenko and Tereshin's postulations rely heavily on a projection of population growth of 9.5 billion by the year 2100. This figure was reasonable in 2008/2010. But it has changed dramatically. The 2015 United Nations Department of Economic and Social Affairs predicts a population of 9.7 billion in 2050 and 11.2 billion in 2100; [8] some place it at 12.0 billion (Carrington 2014; Fischetti 2014). These figures represent about an 18 percent deviation by 2100 from Klimenko and Tereshin's assumptions and call into question their results and conclusions. Additionally, based on current population projections (and other factors) we argued that the economic and social behavior related to the exploitation of global energy sources become less predictable as we approach the boundaries and tipping points beyond the 'peak' of fossil fuels that will occur long before 2100 (Kurtz and Fustes 2014).

We subscribe to the 2014 IPCC report's conclusion that without quick action by the world's governments global warming will get worse and, ultimately, so out of control and costly that mitigation will be impossible and humankind and its civilizations will confront disasters that currently are previewing all around us. [9] So far no government, severely or in tandem, has developed a proper response to the IPCC report recommendations. Delay and indifference to global warming is a chronic global political problem.

Much of the world's scientific community, as well as popular media, agree that global warming is the major existential threat facing human societies. Simply put, the fossil fuel energy we expend to support our modernity drives the heating of the planet

and bodes ill for the welfare of earth's civilizations and human populations (IPCC 2014a). Any analysis of the consequence for human societies of our exploitation of fossil fuels needs to consider the irony of real-world facts that should give pause to those who foresee globalization birthing a utopian new world order.

**Fossil Fuels: Development and Depletion**

First, beginning over 3.5 billion years ago photosynthesis[10] became the source of all life on planet earth and the fossil fuels by which humankind over the last 350 years forged our current civilizations. Second, during these last 350 years – a nanosecond in cosmic time – we have exploited to near exhaustion the fossil fuels created by photosynthesis over the last 3.5 billion years. When they are gone, there are no more. Third, the global warming caused by burning fossil fuels and the commensurate release of carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$) and other noxious molecules have increased steadily since the onset of the Industrial Revolution. '$CO_2$ emissions from fossil fuel combustion and industrial processes contributed about 78 % of the total Green House Gas emission increase from 1970 to 2000 ... a similar percentage (was) contributed (between) 2000–2010 (and) about half of the cumulative anthropogenic $CO_2$ emissions between 1750 and 2010 have occurred in the last 40 years' (IPCC Report, Summary for Policymakers 2014: 6 [SFPM hereafter], parentheses added). These gases are now trapped beneath earth's ozone layer and complete an equation that imperils us and our civilizations. These measurements and other data suggest the accelerating nature of humanities' trajectory toward an unsustainable environment. The current debate regarding the validity of these data relates to whether we are still approaching or already have passed the event horizon beyond which human beings cannot exist.

The ongoing extraction of fossil fuels and consequential global warming represent a grim threat to the survival of civilization and humankind. We should not think that the catastrophic impact of these threats will occur only when these fuels are exhausted. We will experience the impact long before that occurs (many think we are experiencing it now), perhaps while the technology is still capable of extracting the fuels and the economic and environmental cost of extraction is not yet prohibitive.

According to current scientific calculations, oil and natural gas are likely to be exhausted in decades. Coal can last for a couple centuries if it is not used to compensate for the depletion of oil and gas. That would exacerbate global warming (Johnson K. 2015; Kurtz and Fustes 2014). Still, the global warming that is occurring from burning these fuels has received cautious attention by the world's governments only in the last couple decades. That attention has declined due to the current oil glut produced by fracking even though the gases that result from the continued burning of fossil fuels increases the global warming that is the existential threat to which we must respond.

Even if our use of fossil fuels is brought under control or replaced with renewable sources, such as wind or solar, arguable scenarios presently, the planet's temperature and the heat-retaining gases that drive it will continue to rise for an unpredictably long time. Delays in optimizing mitigation will only accentuate problems derived from global warming. Optimistic, taken-for-granted prognostications by big energy cartels and their supporters that our gas and oil resources are reliable for the foreseeable future and that coal remains a reasonable alternative[11] ought to be taken lightly. Based on the most recent evidence climate scientists argue that unless the world's governments and other politically motivated environmental agencies act immediately, by 2030[12] (we think 2050 may still

be reasonable) when (y)our grandchildren will be stewards of planet earth, fossil fuels may be so depleted, coal[13] and nuclear fission such socially, politically, and economically unacceptable alternatives, renewable energy strategies and resources so poorly deployed and under-developed, and the planet so hot that the consequences for human beings and their civilizations will be dire (Gore 2006; IPCC 2014a; Environmental Protection Agency 2014; World Meteorological Association 2014; globalchange.gov 2014; Paulson 2014, [14] among others).

**Anthropology and Global Warming**

Anthropologists have come late to the discussion on global warming and, as Batterbury observes, are 'not strongly positioned in public debate – or research or action in – anthropogenic global warming' (Batterbury 2008: 63). If history is any guide it is not likely that anthropology will become a major voice in the issue. We are notorious for our faddishness, changing topical foci every decade or so. Our fieldwork methodology precludes any hands-on investment in issue we confront. Our much lauded holistic approach is notoriously slow in reaching workable conclusions. When we do make news – other than sensational archaeological discoveries of 'firsts', such as its recent claim to the first murder, arguable new hominin remains, and depictions of anthropomorphized primates on public television – the press often is bad. We are accused of fomenting unrest and spreading disease among native peoples (Tierney 2000) or, 'speaking the language of postmodernism (and) consider science ... just another tool with which Western colonialism extends its "cultural hegemony" by marginalizing the dispossessed and privileging its own worldview' (Johnson G. 2015: D6). These views detract from the efforts of anthropologists who take global warming seriously (Bodley 2012; Matthews and O'Reilly 2013; Barnes *et al.* 2013; Kurtz and Fustes 2014; Roscoe 2014; Fiske *et al.* 2015, among a few others).[15] In this paper we approach the problem of global warming from the theoretical stance of an earlier anthropological fad: the evolution of culture or, more precisely, the evolution of social organization (Kurtz 2011).

Over sixty years ago Leslie White postulated that, 'Other factors remaining constant, culture evolves as the amounts of energy harnessed per capita per year is increased or as the efficiency of the instrumental means of putting the energy to work is increased' (White 1949: 368–369). White was in love with the cultural concept; most anthropologists are. But he was wrong regarding that aspect of his theory related to culture. Culture does not evolve. Culture accumulates (Morgan 1963 [1877]). Social organizations, institutions, evolve as they differentiate and specialize in response to the energy harnessed by the existing technology (Kurtz 2011). The sciemocracy is one institutional manifestation of the evolution of social organization.

Following White's postulation anthropologists generated a body of theory that addressed how energy harnessed by human technologies accounted for the evolution of social organizations of which the world's impending global warming and globalization are immediate consequences (White 1949; Steward 1955; Goldschmidt 1959; Sahlins and Service 1960; Service 1960; Cohen 1968).[16] These theories and up-to-date climate data and their scientific analyses provide an epistemological foundation for explaining the consequences of the relationship between energy, technology, human societies, and the role of the sciemocracy in mitigating global warming. Figure 1 depicts how the positive feedback between energy and technology transfigured human social organizations

by inducing the differentiation and specialization (evolution) of human institutions from less to more complicated structures.

As energy harnessed by a technology ascends on one side of its boundary it creates more work and a positive feedback that causes social organization to evolve (Kurtz 2011; Kurtz and Fustes 2014). For us today the critical juncture in this evolution occurred about 350 years ago (*c.* 1700). At that time coal began to replace wood as the energy source for a slowly expanding industrialization in Europe and elsewhere (Abilov 2011; Smil 2014). The increasing amounts of fossil fuel energy harnessed by human technologies birthed the complex institutions that constitute our current 'modernity'. A decline in the amount of energy harnessed undermines the ability of the technology to create work, causes those institutions to devolve (simplify structurally), and reduces the organizational complexity of human societies. This has happened before in micro-scale (Wolf 1955; Geertz 1963a; Martin 1968).

**Energy: Boundaries, Tipping Points, and Population**

Historically it takes at least 60 years for a new energy source to dominate the world's supply (Smil 2014). For example, from the Paleolithic period through most of the nineteenth century wood provided humankinds' major source of energy. Even as a nascent European industrialization began to expand slowly in the late seventeenth century wood, charcoal, and crop residues (mostly cereal straw) accounted for 85 per cent of global energy. By 1840 coal supplied about 5 per cent of the world's energy. By 1900, 60 years later, coal still supplied only 50 per cent of global energy and remained the twentieth century's most important fuel globally. Crude oil reached 5 per cent of the world's supply of energy around 1915 and to date, a century later, still accounts for only 40 per cent of the world's energy supply. In 1930 natural gas contributed 5 per cent of world energy supply and currently, 85 years later, is creeping slowly to provide about 25 per cent of world supply. Renewable energy sources have not yet had a measurable impact on global energy use and cold fusion remains a dream. If it takes another 50 or 60 years, circa 2070, for renewable energy to begin to make a global impact our civilizations and species could be well along the road to extinction (Parr 2013; Orestes and Conway 2013, 2014;[17] Ahmed 2014; McKibben 2014). A collapse of this magnitude has been the grist of science fiction. It behooves us to see that it stays that way. There is good reason to think it may not.

Three factors relate synergistically at the heart of this crisis: breaching energy boundaries, peaking and tipping of energy reserves, and population growth (Kurtz and Fustes 2014). In the natural sciences a boundary represents a measurable factor that defines a system, determines its behavior and, once crossed, changes the system qualitatively, perhaps irreversibly. For example, 32° Fahrenheit (zero centigrade) establishes a boundary between water and ice; above 32° water flows; below 32° water freezes. This boundary allows reversal.

Energy boundaries are not so reversible. When the world's available or accessible fossil fuels reach 50 per cent they have peaked. When that availability declines to 49 per cent the boundary has been breached, the tipping point initiated, and the supply of that fossil fuel cannot be reversed easily. Fracking for additional oil and gas and the current glut it has provided in world supplies will delay only briefly their tipping point. Because of the fracking boom big energy companies[18] deny that we will ever reach a tipping point for oil and gas. Contrary arguments assert that oil and gas have peaked

and that delay of the tipping point due to fracking or new energy discoveries will be brief.

Some people make compelling arguments, often based on *Deus vult* or *Mercatus vult* ideologies, contrary to scientific evidence that human ingenuity will succeed in producing the necessary alternative and renewable energy sources (Ridley 2011; Klein N. 2014, 2015), or that there is sufficient oil and other fuels to ensure the perpetuation of earth's civilizations (Klimenko and Tereshin 2010; Yergin 2011; Harari 2015). When population growth, especially in the undeveloped nations, is inserted into the equation more people will rely soon on energy sources that are being depleted disproportionate to population growth (Kurtz and Fustes 2014).[19] This will occur regardless of whether population stabilizes at 9.0 billion or, as noted previously, 12.0 billion people (Carrington 2014; Fischetti 2014). At that tipping point humankind will face a crisis of survival related to the synergy of breached energy boundaries, commensurate peaking and tipping of energy reserves, and population growth that will exceed the ability of energy resources and viable environments to satisfy their needs (Kurtz and Fustes 2014).

The impending crisis induced by population growth, burning fossil fuels, and the global warming it provokes is a global problem and its resolution will require a global response, but not necessarily from world governments as currently constituted. For many the notions of global warming and an energy crisis are elusive. The daily activities of the world's ordinary people have not yet been sufficiently interrupted to force them to think about global warming beyond their relative imaginations and feel threatened. In the United States, for example, many of the politicians who ought to be doing something to avert global warming simply do not believe it exists.[20] Mitigation to avert global warming crisis will have to engage a politics that likely will be contentious.

The *sciemocracy* we propose is an alternative to current governance responses to global warming. Sciemocracy is a neologism derived from 'SciDemocracy', a pilot project involving the British Science Association and Dialogue by Design.[21] One of the project's goals is to help the lay public and scientists learn to communicate with each other and, thereafter, intersect their views with those of politicians to influence their policy making decisions. A sciemocracy represents a necessary cultural invention to alter the politics of global warming as we know it. The success of the sciemocracy relies on the ability of scientists and their supporters to change traditionally acceptable cultural habits of cause and effect through political organization, practice, and action (Gramsci 1917; Kurtz 1996a, 1996b) and forge an arm of government dedicated exclusively to mitigating global warming.[22]

**The Politics of Global Warming**

The epistemic foundation to consider the mitigation of global warming involves two dimensions: where we are now and where we have to be around 2050, two decades beyond the IPCC report's recommendation of 2030, until reckoning. *Now* we are in a realm of political thinking and rhetoric on environmental and energy issues that began, arguably, about 50 years ago. The problematic unknown realm is where we will be around 2050 and, more critically, how we get there. These latter decades will provide the temporal political space within which global warming must be mitigated to avert a tipping point from which our civilization and species may not recover. *The politics to challenge this possibility must begin long before that*.

Over the last 45 years (1970–2015) studies that address the politics of global warming have grown nearly exponentially. Still, it is difficult to identify mitigations that result from these politics, even though we have been subjected to an abundance of political rhetoric – the art of using language for political ends – regarding global warming. *Governance*, the practice of implementing policies, is the instrument the IPCC and others rely on for mitigation. In practice, however, governance is thwarted by politics, the development and deployment of power by agents to attain goals in competition with other agents (Kurtz 2001). This is the dialectical juncture where believers in global warming confront the science skeptics and Merchants of Doubt who have controlled much of the politics and rhetoric related to global warming. Perhaps the only positive consequence of global warming politics is that its rhetoric has made more people aware now than 20 years ago that global warming will affect their lives adversely. That awareness has not provoked public outcries sufficient to stimulate serious political mitigation. It is increasingly evident that the lack of policies to initiate mitigation could lock us into a future of socio-cultural and environmental extremes (see Endnote 8) and a global catastrophe (Orestes and Conway 2013, 2014; Kolbert 2014; Orestes 2015a, 2015b, among many others).

Much of the talk that global warming generates is indicative of the politics of the last 50 years. It represents the era of passionate political rhetoric. A reasoned political rhetoric to address global warming intelligently has yet to develop. Passionate rhetoric is persuasion through propaganda, not reasoned argument. Politicians know that passionate rhetoric is more influential than reasoned rhetoric in acquiring support (Bailey 1983) and they are excellent salespeople. The idea that science might be a valued component of governance is not well understood and is, therefore, suspect by much of the world's laity and their governments (Ferman 1997; Orestes 2015a). For the religiose, neoliberals, and others of conservative persuasions science is thought to be a liberal, big-government threat to their cultural values regarding issues such as abortion, same sex marriage, and the right of women to an education (Callison 2014). To others that do not deny science outright its methodologies are too slow and contradictory (Boehmer-Christiansen 1997). In the United States, presumably a world leader in science, the idea of including science as a partner in governance has stagnated (Sussman and Daynes 2013). Where we must be by 2050 to avert the negative consequences of global warming will require political practices and policies that do not exist (Piketty 2014; Sokona 2014).

Global warming represents a catastrophe developing in slow motion. So far it has left no deep footprint relative to the existential threat it poses to humankind. Its effects globally have been unevenly distributed, temporally discordant, and insufficiently devastating to intrude into the quotidian thoughts and practices of the world's governments. The insidious intervention of global warming into human affairs over the ensuing decades (2020– circa 2050) will gradually coalesce, if not mitigated, into a gargantuan abomination that defies mitigation. As that occurs changes that degrade human civilizations will increase, ultimately exponentially, and there will be no recovery. This is the subtext of the 2014 IPCC report.

Because of global warming's slow progression the politics of the next thirty years will not differ immediately from that which existed in the previous half century. It will take time to establish a sciemocracy. Global warming already is nudging the 2° Celsius (37.6 Fahrenheit) increase, the IPCC benchmark, after which the planet becomes too hot

to support human life. If that benchmark is exceeded, the mitigation will become prohibitively costly, increasingly desperate, and ultimately useless.

The sciemocracy is a response to recognition by the IPCC and others that current mitigation practices simply are insufficient and new strategies are essential. Piketty, for example, points out that 'when it comes to organizing collective decisions (for problems such as global warming) *new forms of participation and governance remain to be invented*' (2014: 569, parenthesis and italics added). This is an especially prescient observation since Youba Sokona, Co-chair of 2014 IPCC report, laments that 'It is technically feasible to transition to a low-carbon economy. *But what is lacking are appropriate policies and institutions*' (Sokona 2014: 2, italics added).[23] Sciemocracy represents an institutional framework designed to establish the appropriate mitigation policies and institutions to avert a global disaster.

**Sciemocracy**

**Preamble.** The sciemocracy is a necessary adaptation in political organization and practice to the existential threat posed by global warming. The sciemocracy shall consist of an *Environmental Science Action Assembly* (ESAA hereafter). The Assembly shall consist of two mutually interactive bodies: a *Global Environmental Science Action Assembly* which shall be independent of the governments of the world's nations and a *National Environmental Science Action Assembly* that is representative of each of the world's participating nations. Each Assembly shall be composed of accredited, qualified, and expert scientists (see Fig. 2). The rationale to explain the independence of the Global ESAA from the world's governments is simple: *few of the incumbents of the offices of the world's governments are sufficiently knowledgeable of the science related to global warming to serve responsibly in the development and deployment of mitigation strategies in the relatively short time we have to avert disaster.*

The core principle of the sciemocracy relies on the basic rules of risk management related to a problem: *the people most knowledgeable and capable of controlling the risk shall be put in charge of managing the risk.*[24] *Doctors treat illnesses; carpenters do not*. Ergo, bona fide scientists, not politicians, need to be in charge of fixing the risk global warming poses to humankind and its civilizations. Too many politicians are proud of the ignorance their political ideologies have imposed on their decision making abilities to think seriously about global warming (Klein E. 2014). Subject to rules and reviews by advisory boards of the sciemocracy, the Global and National ESAAs shall be obligated to use and refine scientific principles, methodologies, and technologies to mitigate global warming.

In the sciemocracy the governments of the world's nations shall retain control over issues that are not related to global warming. Responsibility for mitigation shall be the exclusive prerogative of the Global Environmental Science Action Assembly (Global ESAA hereafter) and the National Environmental Science Action Assemblies (National ESAAs hereafter). The Global ESAA shall convene as a body at prescribed times to consider items on an agreed agenda or to resolve emergencies.

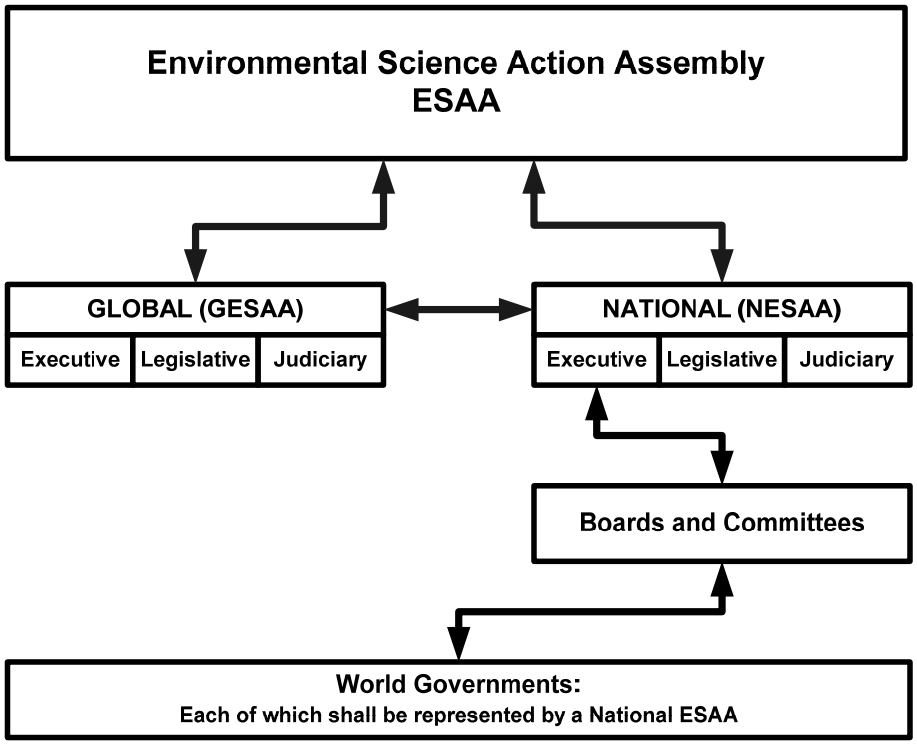


**Fig. 2. Sciemocracy framework (orignal Kurtz and Fustes 2014)**

The Global ESAA, though separate from existing world governments, shall consist of executive, legislative, and judicial offices vested with powers available for access and application by the incumbents of those offices. The powers embedded in those offices will expand as the sciemocracy matures. The establishment of a secure budget shall be a *primary priority* of the sciemocracy. The Global ESAA shall acquire administrative budgetary powers over funds allocated through taxes from the nations under the environmental jurisdiction of the ESAA and pledges from private foundations, organizations, and benevolent billionaires dedicated to mitigating global warning.[25] Pledges may provide initial financial support until tax rates provided by national governments are established. These budgetary sources will enable the Global ESAA to effect the development, implementation, and enforcement of Youba Sokona's 'appropriate policies and institutions' necessary for mitigation.

National ESAAs shall exist separate from but through their own executive, legislative and judicial offices interface with both the Global ESAA and the governments of which each National ESAA is representative. National ESAAs will coordinate, negotiate, and interface through permanent and ad hoc committees, review and advisory boards, and appropriate national judicial bodies with the Global ESAA and world governments on policies that are directly or indirectly related to global warming**.** Committees and advisory and review boards shall be constituted of National and Global ESAA representatives, thereby assuring interface with world governments on issues related to global warming.

The framework for the sciemocracy consists of four components: the *source* of the Global and National Environmental Science Action Assemblies, the *institutionalization and structure* of the global and national ESAAs, the *rules* and *regulations* that govern their activities, and the *governance goals and political practices to attain them*. Particular aspects of this framework shall be developed speedily as the sciemocracy evolves.

**Source**

1. The environmental scientists that will constitute the sciemocracy shall be selected primarily from among those that are or have been active in the IPCC and other agencies and institutions committed to mitigation and are representatives of the world's nations (see Endnote 4).

2. Members of the Global and National ESAAs shall recruit from among themselves the numerical representation of each branch and the committees necessary to the functions and representations of the sciemocracy.

3. Review boards, such as an Office of the Independent Reviewer, and a judiciary to oversee the policies and practices of the ESAA, shall consist of qualified, accredited environmental, physical and social scientists, engineers, and jurists drawn from their respective disciplines, law schools, and the International Court of Justice, The Hague.

**Commentary.** *The argument that 97 per cent of the world's scientists agree that global warming is an existential threat to human populations and civilizations is sufficiently supported*[26] *to provide the science-based political agency for the sciemocracy. Arguments that scientists are not interested in politics are belied by the voluntary and widespread participation of scientists in the IPCC (see Endnote 4). The IPCC's working groups remain in contact and cooperate in formal and informal subgroups to pursue various common agendas related to global warming. Other personnel, if necessary, may be recruited from among the remaining world-wide pool of acceptable scientists, scholars, and jurists. The sciemocracy shall empower them to comply with the IPCCs presumptions on the relationship of politics and science: 'Climate policy can be informed by the findings of science and systematic methods from other disciplines' (and) 'The design of climate policy (shall be) influenced by how individuals and organization perceive risks and uncertainties and take them into account'* (IPCC 2014b: 4, 6, parentheses added).

**Institutionalization and Structure of the Sciemocracy**

1. World's scientists announce their intention to establish a sciemocracy constituted of two legislative bodies: the Global ESAA and the National ESAAs. They shall be obligated to respond exclusively to issues related to global warming. All other governance functions and issues remain the purview of each nation's government.

2. Scientists of the world's nations convene and elect from among themselves the executive and legislative branches of the Global ESAA.

3. Scientists also convene in each of the world's nations and establish National ESAAs to interface with the Global ESAA and each nation's government.

4. At least one member of each National ESAA shall be designated to serve on the Global ESAA.

5. An Office of Independent Reviewer (OIR) and judiciary of the National ESAA shall be established in each nation and complemented by The International Court of Justice, The Hague.

**Commentary.** *The sciemocracy, like the government of every nation world-wide, will consist of a structure of abstract offices vested with powers and authorities accessible to the incumbents of those offices to propose and enact policies within its sanctioned purview: the mitigation of global warming. As an institution of the sciemocracy the Global ESAA will negotiate and coordinate via the National ESAAs with world governments however construed*[27] *the resources essential to mitigation.*

*As occurs commonly in political change, most existing institutions and offices of these governments shall remain in place and retain their traditional powers and authorities. But with reference to global warming these institutions shall be subject to the leadership and governance authority of the global ESAA and its exclusive commitment to mitigation. The sciemocracy shall not replace existing government structures and authorities (political, military, legislative, judicial and the like) of any existing world nation.*

*Creating a different form of government quickly may sound impossible. History suggests otherwise. The United States from its declaration of independence in July, 1776 to the inauguration of its Constitution in June, 1788*[28] *managed in 12 years with poor communication and a long war to unite 13 obstreperous and recalcitrant colonies against an existential threat to their existence – England – and create a new nation with a functioning democracy. After the defeat of Axis fascism in 1945 the United Nations was created to establish a unity of nations to ensure global peace. In Africa and Asia traditional cultures became new nations seeking modernity status almost overnight as the European empires collapsed following World War II (Geertz 1963b). In 50 years (1965–2015) Singapore evolved from a not-always benevolent dictatorship to an enviable exception in 'human-development' indicators (The Economist 2015: 1–12). There is no reason other than indulgent self-interest to preclude or impede the establishment of a sciemocracy.*

**Rules for and Constraints on the Sciemocracy**

1. The boards of advisors (see point 3, Source) shall be available to monitor the practices and technologies for mitigation and preclude unforeseen, deleterious social and cultural impacts on human societies and their cultures.[29]

2. The Office of Independent Reviewers (OIR) shall be vested with the power to mediate and arbitrate, if necessary, resolutions to disagreements. National judiciaries established in each nation shall provide appellate services to litigants. The International Court, the Hague shall provide the ultimate source of appeal.

3. The sciemocracy shall have the right to make mid-course corrections in all matters related to global warming to insure success of misdirected policies and practices or those imposed by arbitration.

**Commentary.** *Only the most egregious autocratic dictatorships govern without some legally imposed constraints on their practices. The sciemocracy's boards of advisors will advise and respond to queries regarding social and cultural benefits and/or deficits from particular policies. This represents another dimension of risk management: other agencies of the sciemocracy may have insight into the consequences of various policies of which those proposing the policy may not be immediately cognizant. At other levels of concern the sciemocracy will cope with issues related to problems of*

*mitigation. They will reflect degrees of gravity and require appropriate voting procedures to assure compliance. Some matters may require special attention, perhaps rejection, as the result of arbitration by sciemocratic agencies; mid-course corrections are essential aspects of arbitration and mitigation practice.*

**Governance Goals and Political Practices of the Sciemocracy**

1. Organize and support an enabling referendum from the peoples of the world's nations to install the sciemocracy and secure funding to mitigate global warming; a simple majority by a nation's population shall be sufficient to install the sciemocracy.

2. Actively seek financial and moral support from world governments, private foundations, wealthy supporters, and others committed to carry out the ESAA agenda and enable mitigation. Acquiring revenues to ensure support for mitigation shall be a goal of the sciemocracy.[30]

3. Establish a hierarchy of 'voting majorities' (percentages to be decided) necessary to pass policies by which problems with differing degrees of urgency related to global warming may be resolved. These problems are related to housing, landscape, transportation, greenhouse gas emissions, technologies and the like. In response to particular problems they may require different majorities at national and global levels to enact policies that enable mitigation and reflect the cultural and natural resources available to each nation.

4. Begin the conversation to inform the world's population, in particular its youth, creatively and robustly through all available media of the imminent threat posed by global warming and, thereby, seek support to:

– assist in persuading reluctant governments to provide the funding necessary for mitigation;

– educate polities to the value of science, its practices, and goals in a language everyone can understand;

– respond creatively to debunk passionate propaganda from global warming skeptics and others employed by special interest groups;

– segue as issues and policies demand into reasoned arguments for mitigation;

– develop campaigns to inform constantly the world population of the threat of global warming and steps being taken to mitigate it;

– ensure that global warming does not become a more serious threat to world peace and security than already exists.

5. Reserve the right to bring the full weight of international law to sue,[31] impose severe sanctions and fines and, as a last resort, use force provided by the United Nations and/or nations in the sciemocracy as corrective actions against nations that advance their own interests independently and attempt to ride free on the accomplishments of the sciemocracy.[32]

6. Reduce the paralysis of inaction induced by the plethora of studies, scientific and otherwise, related to global warming that prolong debates and gain no traction in mitigation.

7. Establish priorities for world-wide regions and sectors most affected by global warming.[33]

8. Organize mitigation practices around established and specific goals; manage and reduce the propensity of scientists to talk, argue, and always seek more data.

9. Ensure the significance and appropriateness of mitigation methodologies.

10. Allow for mid-course corrections in policy and practice.

11**.** Avoid no-win-situations: oppose dirty tricks and obsessive cheating by global warming skeptics by reprogramming current political failures and deploying innovative practices to mitigate global warming effectively.

**Commentary.** *The lack of predictable, guaranteed sources of funding that undermined the power of the United Nations to fulfill its obligations must not be allowed to wreak havoc on sciemocratic mitigation policies. The threat global warming presents to world security must not be allowed to develop; this imperative must be recognized by all national governments and forestalled. Revenues to enable the governance and politics critical to the sciemocracy's mitigation must be sufficient to counteract the practices of science skeptics to thwart mitigation and impose neoliberal market policies and pre-modern Salvationist ideologies in its stead. The influence of neoliberal values may be difficult to displace. They are grounded in a fundamental hostility to government solutions of almost any sort. Pre-modern religious ideologies may be breached and their adherents convinced to support sciemocratic mitigations if scientists learn to speak to their concern to 'save God's handiworks,' 'help the poor,' and lay aside issues that provoke nonproductive culture wars (Callison 2014; Jenkins 2014; Pope Francis 2014).*

*Funds to mitigate global warming may come from a variety of sources. Benevolent billionaires who support mitigation might provide initial support until revenues can be secured from national sources in the sciemocracy (see Endnote 23). Reallocation of existing investments by humanitarian organizations could make a difference. The Melinda and Bill Gates Foundation, for example, invests heavily in global programs to eliminate malaria. As global warming worsens the environments that breed disease vectors such as malaria born by anopheles mosquitoes and the Zika virus born by Aedes Aegypti mosquitoes will increase. Funds from humanitarian foundations are better applied to interdict underlying cause of malaria, the Zika virus, and other disease vectors, such as Ebola. These and other maladies will increase as global warming worsen, earth's biosphere changes, agricultural production decreases, population growth increases, and people stressed increasingly by food and energy shortages migrate and conflict with populations in less affected regions. These funds can be used better to support the sciemocracy's mitigation.*

*The same kind of passion and dirty tricks used so effectively by the special interests that fund science skeptics and work against the well-being of the world's populations should not be ruled out as mitigation strategies. The sciemocracy must capture the attention and support of young adults who will have to live in the world whose future is being sacrificed to short term greed and profound ignorance. As the threat of global warming is acknowledged globally creative but reasoned argument must prevail eventually and deny the abomination global warming represents.*

## Considerations

The First Assessment Report (FAR) of the Intergovernmental Panel on Climate Change (IPCC) was completed in 1990. Since then FAR has served as the basis of the United Nations Framework Convention on Climate Change (UNFCCC) and the subsequent high profile international meetings, such as Kyoto and Copenhagen, that helped increase popular awareness of threats to the environment and its sustainability. Yet the

quantitative consequences of those meetings and conventions have been limited, diminished, derailed, or marginalized by science skeptics and national self-interests.

The Executive Secretary of the UNFCCC concluded that 'The current pledges under the second commitment period of the Kyoto Protocol clearly are not enough to guarantee that the temperature will stay below 2 degrees Celsius and there is an ever increasing gap between the action of countries and what the science tells us' (Figueres 2012). At this writing the highly touted 2015 Paris Conference on Global Warming is drawing to a close. Reports from various media do not exude confidence that the worlds' governments will arrive at a satisfactory agreement on how to mitigate global warming. *This is the major rationale for a sciemocracy that may be capable of developing scientific and government consensus to implement and enforce global warming mitigation strategies (see addendum).*

The sciemocratic mitigation of the existential threat global warming poses to humankind and its civilizations is not yet reality. Ultimately mitigation will rely on 'the skeptical, questioning virtues of an experimental turn of mind: the acceptance that truth is provisional, that questioning of experts should be encouraged, that steps forward may need corrective steps back, and understanding the human condition is the surest foundation for progress' (Jasanoff 2014: 3 also see Smolin 2008). Impediments to the success of a sciemocratic mitigation exist in what is *not* identified in the IPCC report: the institutions and mechanisms necessary for mitigation (Sokona 2014).

The 2014 IPCC report provides the epistemological foundation to inform us what needs to be done regarding mitigation; it is rife with recommendations. Identifying some of these suggestions illuminates the work the sciemocracy must accomplish and the dilemmas and contradictions the report poses to sciemocratic mitigation.

The IPCC Report Summary for Policy Makers (IPCC 2014b) states that the 'objective expressed in Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) ... is to achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system ... within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.[34] Climate policies can be informed by the findings of science, and systematic methods of other disciplines' (IPCC 2014b: 4).

The report's authors set, as noted, 2030 (2050?) as the benchmark to stop earth's atmospheric temperature from increasing another two degrees Celsius (3.6 degrees Fahrenheit). That is the point after which most climate scientists believe the planet may become too hot to accommodate human life. Three salient factors need to be addressed to insure the 2030/2050 goal of reducing carbon emission: cost effective measures to control growth, out of control population increases, and agents that advance their own interest independent of the common good and ride free on the efforts of other's. Otherwise 'issues of equity, justice and fairness (will) arise' and contribute to global warming (IPCC 2014b: 5). The authors then segue into the kind of issues a sciemocracy could address best:

> 'Risks and uncertainties ... are difficult to measure ... but would have significant impact if they occur ... and influence how they are taken into account' (*Ibid.*: 6);

> 'Economic and population growth ... are the most important drivers (of global warming) ... and between 2000 and 2010 ... outpaced emission reduction' (*Ibid.*: 8, 9);
>
> 'Current scenarios' suggest that by 2100 $CO_2$ concentrations 'are more unlikely than likely to keep temperatures below 2° Celsius' (*Ibid.*: 10);
>
> 'Delaying mitigation beyond ... 2030 substantially increase(s) the difficulty of ... maintaining temperature change below 2° Celsius' (*Ibid.*: 13);
>
> 'Adverse side-effects as well as co-benefits ... from climate policy have not been well-quantified' (*Ibid.*: 18).

And the list goes on to include discrete problems related to energy supply and use: industry, buildings, agriculture and land use, human settlement planning, and the like. Other than noting that, 'Recent advances in technologies ... provide opportunities to stabilize or reduce ... energy use by mid-century' (*Ibid.*: 24) the IPCC provides no solutions to global warming. *And it is unlikely there will a solution if politicians remain in charge of the governance necessary for mitigation*.

Suggestions to mitigate global warming, including the 2014 IPCC report, rely on the idea and practice of 'governance'. A composite of ideas regarding governance extrapolated from the vast and growing literature on this issue might read thusly if all governments were in agreement: governance consists of a collaboration of private and public, national and local, transnational and international governments, agents, policy makers, 'informal institutions', communication networks, and 'incentive structures' coordinated to provide the mechanisms and measurements necessary to steer the world's societies toward preventing, mitigating, or adapting to the risks posed by global warming (IPCC 2014a: ch. 4: 19 ff.; Garner 2011; Ferman 1997; Carvalho and Peterson 2012; Sussman and Daynes 2013; Bulkeley *et al.* 2014; Parr 2013; among others). Within the few decades we have to accomplish mitigation, governance other than by a sciemocracy is not likely to accomplish these goals.

The IPCC report makes a powerful case for renewable alternatives to burning fossil fuels and the greenhouse gases that result. But the production of every existing renewable energy source requires expenditures of energy from fossil fuels; in fact the production of almost *everything* we take for granted in our daily activities – packaging, clothing, plastics, rubber, electricity, construction and production of nuclear plants, wind farms, solar panels and so forth – even some foods – contains and/or uses petroleum. If we succeed in replacing energy from fossil fuels with wind farms or solar fields the construction of the grids to transmit that energy where it is needed will require the expenditure of fossil fuels as well as huge investments. We are in a fossil fuel energy sump the extrication from which will challenge the sciemocracy and reconstitute our current modernity into some narrative or paradigm yet to be identified.

The 2014 IPCC report implies that the goal of mitigation is to preserve the modernity that has helped to generate the global warming we confront by allowing 'ecosystems to adapt naturally to climate change … and economic development to proceed on a sustainable manner' (IPCC 2014b: 4). This is business as usual. So far responses to global warming by politicians and scientists alike have not led to any serious humanity-serving mitigation. Largely that can be attributed to the energetic decline of the robust evolution of the modernity paradigm over the last half century or so. To paraphrase Elman Service (1960), the modernity paradigm has lost its evolutionary potential.

The centuries-long span of modernity's exceptionalism is nearly exhausted because the fossil fuels that birthed that exceptionalism have attained the limits of their energetic contribution to the evolution of our civilizations – and that contribution is nearly exhausted. Our current modernity represents a malaise of conjoint, hyper-articulated, hyper-integrated, and hyper-magnified institutions that impede the abilities of humans to think outside the box and create the science that mitigation requires. As Parr notes, despite how the modernity paradigm has driven 'change in the modern world, everything continues to stay the same – perhaps because modernity produces a virulent strain of amnesia' (Parr 2013: 2).

Our civilizations require a swerve of the proportions that birthed the Renaissance but in a fraction of the time it took for the Renaissance to mature. To the extent that politics is responsible for inventing organizations and practices that evoke new cultural patterns the sciemocracy may provide the necessary swerve because it exists outside the modernity box that inhibits thinking and acting differently. Figure 3 suggests the paradigmatic transformations from a pre-modern *Deus vult* (a) to the Renaissance (b) and the modernity paradigm (c) that currently constrains our ability to think and act outside that box. Fig. 4 relies on the nine dot puzzle to demonstrate the breakout of a sciemocratic paradigm (the hatched tips) beyond the constraints of the modernity box (Fig. 4). The nine dot puzzle poses a problem: connect all the dots that make up the square box by drawing no more than four lines without taking the pencil/pen off the paper.[35] Projecting the directional arrows that solve the puzzle beyond the 'Modernity Box' and the dotted, porous lines that now only partially encases it, enables the extrusion of the sciemocracy outside that box and releases its potential to respond to the imminent and existential threat global warming imposes on humankind (Fig. 4).


**Fig. 3. Progression of historical change (original, Kurtz and Fustes 2014)**

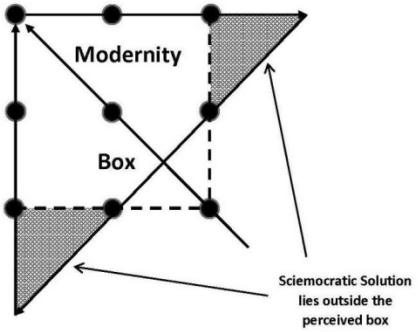


**Fig. 4. The modernity box and extruded Sciemocracy (original Kurtz and Fustes 2014)**

Modernity as constituted will not survive; indeed, some already identify a new ecological formation as *postmodern* (Glover 2006). We think postmodernism is a bankrupt pastiche of strained narratives. We need a sciemocracy that provides the lay public, scholars, scientists and political leaders with a shared and better understanding of the potential of science to resolve problems related to global warming. This does not require postmodern prognostications.

**Epilogue**

In the Kobayashi Maru scenario only one cadet, the future Captain James Kirk of the star ship *Enterprise*, solved the problem, saved the Kobayashi Maru, and passed the test. He rejected the normative rules by which other star fleet cadets responded to the test. Instead he engaged a pragmatic subterfuge to solve the conundrum. The night before his third test (he failed the first two) he surreptitiously reprogrammed the simulator to make it possible to rescue the freighter. He justified this chicanery and his character to the satisfaction of his mentors because, when he was accused of cheating, he responded that he did not 'believe in no-win situations'. The sciemocracy is our solution to avert a no-win situation posed by global warming. We need not excuse our dirty tricks to science skeptics. We need only to avoid a no-win situation.

Planet earth will survive any impending natural catastrophe for eons to come. This may not be so for its crew, their civilizations, and other terrestrial, pelagic, and lacustrine species which already are experiencing mass extinction due to global warming (MacLean and Wilson 2011; Kolbert 2014; McCalman 2014). We are not yet in a no-win situation. But if our species is unable to mitigate the global warming induced by the human gluttony for fossil fuels the current plethora of sci-fi movies that depicts a future dystopian spaceship earth may well presage a dark reality.

**Addendum**

As we were concluding work on this paper the Paris Conference on global warming that convened on November 30, 2015 ended on December 11, 2015. On December 12, 2015 the agreement (United Nations, 2015, the Paris Accord hereafter) was released for public scrutiny. It is a masterpiece of diplomatic accomplishment the likes of which on a global scale has not been seen since the establishment of the United Nations in 1945. From our perspective the Paris Accord is only a first step to the more capable and dependable solutions for mitigation provided by the sciemocracy we propose.

There is considerable point by point correspondence between the Paris Accord and the sciemocracy. They differ greatly regarding enforcement and funding. All mitigation practices and their funding by the nations involved in the Paris Accord are voluntary. The Sciemocracy establishes the mechanisms and structure to enforce mitigation, control the risks involved, and secure the fund essential to these tasks (see Fig. 2). The Paris Accord subsumes mitigation and funding strategies under the aegis of the United Nations, an institution notoriously lacking in this authority and power.

In essence the Paris Accord is a wish list encased in a hope chest. It identifies the existential threat represented by global warming and the actions that are needed to mitigate the threat. By failing to provide the personnel with the power and secure funding necessary to mitigate the threat of global warming the Paris Accord does nothing to assuage Yoruba Sokona's (2014: 2) lament that mitigation strategies 'lack appropriate policies and institutions.'

The Paris Accord hopes to mitigate global warming by 2030. We suspect that without means of enforcement and secure funding the 'conference of the parties' that represents the signatories to the Accord will know long before 2030 if their efforts are futile. At that point they may look favorably upon our suggestions for a sciemocracy to mitigate global warming and avoid a catastrophe due to human neglectfulness that terminates life and cultures on earth as we know them. We hope the Paris Accord results in the successful mitigation of global warming. We are not confident that will occur. Ban Ki-moon, Secretary General of the United Nations, said 'there is "no Plan B" if the deal falls apart' (Davenport 2015: 18). Sciemocracy provides a 'Plan B'.

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Hans Claessen, Gabriel Ferreyra-Orozco, and James McDonald read this paper and provided suggestions that improved it considerably. Thanks to each for their time and effort. John Wood provided staggering amounts of data from a multitude of sources that enhanced the paper's integrity. Thanks to Jean Mitchell who proofread the final draft.

## NOTES

[1] Climate change is a misdirected conservative euphemism for global warming. Climate change came into fashion in the early years of the G. W. Bush presidency when an aide recommended the use of climate change instead of global warming because it sounded less threatening (Burkman 2014).

[2] For a complete analysis of the ideas of the political office, the resources of political power and politics see Kurtz (2001, 2004).

[3] These often are the same individuals hired by tobacco, asbestos, pesticides and other industries that work against the public good for profit. For profiles of these 'Merchants of Doubt' and science skeptics see Orestes (2011) and Readfearn (2015).

[4] The film, *The Wrath of Khan II*, depicts this scenario.

[5] We thank Paul Krugman (2014) for the *Deus vult-Mercatus vult* ideas.

[6] The IPCC report relies on data available through 2012. It required the work of more than 830 lead authors and review editors from over 80 countries that covered a wide range of scientific and technical expertise, supported by over 1000 contributing authors and 2000 expert reviewers who assessed more than 30,000 scientific papers to develop the 2014 IPCC report. About 60 authors and editors from the IPCC Bureau and IPCC Working Groups were involved in writing the report (IPCC Press Release 2014a).

[7] Klimenko and Tereshin's models include a 'historical extrapolation approach,' a 'Genetic Forecast of Global Energy Consumption' developed at the Moscow Energy Institute, and Toynbee's (1988) 'Principal of Progressive Simplification'.

[8] See URL: http://esa.un.org/unpd/wpp/publications/file/2015.

[9] A preview of impending disasters includes melting glaciers and pole ice, submerged island nations, inundated coastal cities, mega-storms and floods, depleted ground water sources, protracted droughts, reduced food production, acidified oceans, dying coral reefs, species extinction, diffusion of alien insects and pathogens, burned and decimated forests, migrations of displace, hungry and angry populations fraught with social conflicts.

[10] Photosynthesis is the process by which light energy produced by the sun converts carbon dioxide ($CO_2$) and water ($H_2O$) into sugar ($C_6H_{12}O_6$), traps carbon atoms in solid form, and releases oxygen ($O_2$). See Kurtz and Fustes (2014) for a complete analysis of the implications of photosynthesis for our fossil fuel energy supplies.

[11] Even though big energy companies admit that it is more difficult to obtain gas and oil, they continue to insist that these fuels will be available for the foreseeable future (Douglas-Westwood 2014; Colville 2014; Hamilton 2015).

[12] 'Immediately' (and 'now') for the IPCC (2014a) report refers roughly to 2030. The report suggests that if ambitious mitigations to thwart global warming are not undertaken over 'the next 20 years' (*c.* 2030) goals projected to reduce global warming emissions 'by 2100 may no longer be possible' (IPCC 2014a, ch. 6: 99, parentheses added).

[13] Coal will be burned for the foreseeable future. It may trash the environment, but it is plentiful, cheap, puts people to work, and is the energy of choice in many developing nations (Johnson K. 2015).

[14] Henry M. Paulson Jr. was Secretary of the Treasury under the Bush administration when the credit bubble burst in 2008 and pushed the world's economy into a recession from which it is still recovering. He is included here only because he is one of the rare conservative 'politicians' to argue that climate change is a threat to the world's future well-being and that American Businesses must act to avoid a 'Climate Crash' (Paulson 2014).

[15] The American Anthropological Association sponsored and adopted recently the report of the Global Climate Task Force (Fiske *et al.* 2015) as its formal position on climate change.

[16] For contemporary anthropological contributions to this literature see Claessen (2000), Kurtz (2011), Grinin (2012), and Grinin, Ilyin, and Korotayev (2012).

[17] The 2014 work by Orestes and Conway, *The Collapse of Western Civilization: A View from the Future,* is a small book-length version with authors' commentary of their 2013 paper in *Daedalus.*

[18] The five largest oil companies are BP, Chevron, ConcocoPhillips, ExonMobil, and Shell (Bodley 2012: 116).

[19] Zinkina and Korotayev (2014) predict an explosive population growth – doubling, perhaps tripling in the next few decades – in sub-Saharan Africa which can undermine development and foment violent conflict. Improved family planning and, especially, education of the female population may forestall this crisis.

[20] On 4 November 2014, politicians in the United States who are most hostile to scientific solutions to global warming were voted into positions of power and influence that can delay for decades any policies to deter global warming. James Inhofe, senator from Oklahoma, who calls global warming a 'hoax' (Inhofe 2012) will become chairperson of the Senate Environmental and Public Works Committee.

[21] Dialogue by Demand is a consultancy firm that specializes in providing consultation on contentious or complex issues to help people have a say in big decisions that affect their lives.

[22] In 1939 Albert Einstein wrote a letter to President Roosevelt that helped develop the Manhattan project and the Atomic Bomb. That letter curiously presaged some of the arguments we make for a sciemocracy: an existential threat [Nazi Germany – global warming]; control of key resources [uranium – renewables]; financial assistance [important people and giants of industry – benevolent billionairs and environmental foundations]; solution [Manhattan project – sciemocracy] (Einstein 1939).

[23] IPCC Press Release, 2 November 2014 (IPCC 2014a).

[24] Risk management is largely the concern of business, financial, and investment officers, but its implications are more widespread. See URL: http://en.wikipedia/wiki/risk-management.

[25] Tom Streyer, the founder of The Next Generation Action Organization, and Richard Branson, the chairman of Virgin Groups Ltd, among others, already are heavily invested in mitigation efforts.

[26] See Orestes (2004) and Cook *et al.* (2013).

[27] The current nations of the world might be classified as autocratic (Russia, China, and North Korea), democratic (Western Europe), emerging plutocratic (the United States), and theocratic (Iran, Vatican).

[28] See *The Constitution of the United States of America with the Declaration of Independence* 2012.

[29] This was the fundamental purpose of the 'Cultural and Technological Studies Programs' installed in many universities in the Western world in the early 1970s (Kurtz 1979). These programs were scuttled largely due to insufficient funding in the economic environment following the end of the Vietnam war.

[30] Piketty argues that 'There is good reason to spend the equivalent of 5 per cent of global GDP annually to ward off an environmental catastrophe' (Piketty 2014: 569).

[31] Lawsuits against polluting companies are already occurring in the United States, Europe, and Oceania, and 'More lawsuits are in the pipeline' (Greco 2015: 2).

[32] See IPCC 2014b: 5; also see Nordhaus (2015).

[33] See *Summary for Policy Makers,* IPCC 2014b.

[34] Around 2010, the time frame around which the IPCC 2014 report developed, it was hoped that global warming could be held below 2 degrees Celsius (3.6 degrees F) above the preindustrial level. That is the point after which it may be impossible to avoid dangerous and costly effects from global warming (IISD 2014). Even then this goal was more a wish that an expectation (IPCC 2014a, Ch. 1: 4). In 2015 negotiators met in Lima, Peru to draft new global warming protocols. They were unable to agree on how to reduce emissions. Many scientists are resigned to the likelihood that the greenhouse gas emissions will not be reduced sufficiently to stop the earth's atmosphere from exceeding the 2 degree Celsius tipping point.

[35] There are four solutions to the puzzle depending on which corner one begins the solution.

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