

Ecological Survival and Revolutionary Change

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INTRODUCTION

A fundamental shift in the conditions of human life necessitates a fundamental shift in social arrangements. When key technologies matured during Europe's feudal period, the stage was set for rapid increases in production and consumption. These developments triggered the economic transformation from feudalism to capitalism and the transfer of social leadership from landowners to factory owners.

A far deeper and more significant shift has now occurred. The over-expansion of the global economy has spawned an ecological crisis that threatens both humankind and nature. But, just as yesterday's landowners could not adapt to the new technologies by moving to a manufacturing economy, today's capitalists cannot adapt to the ecological crisis by moving to a sustainable economy. Existing social arrangements must therefore be fundamentally altered. *Ecological survival demands revolutionary change.*

In this document I present an analysis and strategy based on this argument. I first describe the current situation: the ecological crisis, the rational response to it, and the disastrous prevention of this response by social leaders. I then examine how it might be implemented despite the intense opposition. My assumption is that the reader is deeply disillusioned with today's environmental initiatives and is prepared to seriously consider new and challenging ideas.

A. CRISIS AND RESPONSE

1. THE ECOLOGICAL CRISIS

Every economy is based on three core processes: the extraction of resources from nature, the use of these resources to satisfy human needs and wants, and the return to nature of the resulting wastes. This flow of extraction, production, consumption, and disposal places strains on the environment that increase with production quantities. If the economy continues to expand, and if higher efficiencies fail to compensate, these strains will eventually exceed natural limits and environmental damage will occur.

In a nutshell, this is what happened to the global economy in the 20th century. Prior to 1950 the environmental pressures rose steadily, but critical natural limits had not yet been reached and ecological damage was relatively minor. Then the situation changed dramatically. Around this date the atmosphere's CO₂ concentration soared above its long-term maximum of 300 parts per million (ppm), thereby initiating climate and ocean damage. This was an early indication that the environment was being overwhelmed by humankind's economic activities, and that *ecological overshoot* had therefore occurred.

These two developments - economic over-expansion and the resulting ecological overshoot - are at the heart of today's ecological crisis. The nature and scope of this crisis are depicted in the diagram below.

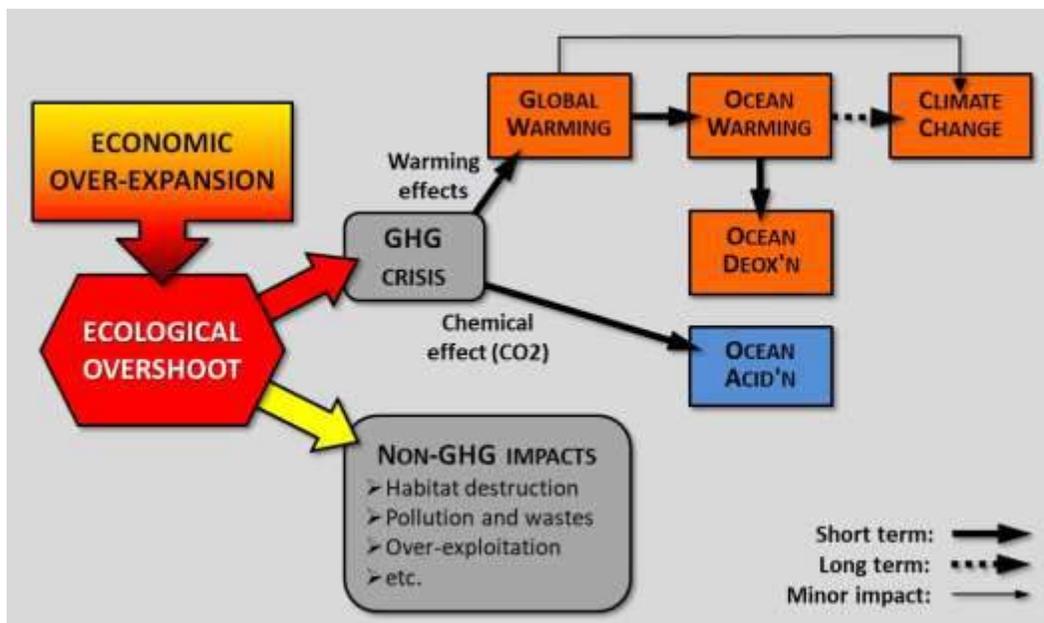


Figure 1 – The ecological crisis

As shown, ecological overshoot resulted in two distinct sets of environmental impacts, which together constitute the ecological crisis. The first is the greenhouse gas (GHG) crisis. This is an extreme emergency due to the proximity of tipping points and points-of-no-return (see box), especially in the rapidly melting Arctic. The second are the various non-GHG impacts, such as habitat destruction, pollution, and wastes. These can seriously harm ecosystems and reduce biodiversity, but their tipping points are likely further away and they can therefore be addressed at a somewhat lower priority.

Tipping Points and Points-Of-No-Return

A *tipping point* is the level of environmental impact where damage increases abruptly due to cascading effects, positive feedbacks, or other factors. If the impact continues to escalate, a *point-of-no-return* could be reached. At this stage human efforts no longer suffice to reverse the damage, which means that ecosystem collapse is inevitable. (For details see [this post](#).)

The GHG crisis requires extensive clarification because it has been profoundly distorted by those seeking to avoid fundamental change.

The most critical point is that this crisis was caused by *unsafe GHG concentrations* - that is, levels of CO₂, methane, nitrous oxide, and other GHGs that have risen above their long-term maximums and have therefore damaged the environment that underpins human civilization. Contrary to facts and logic, today's climate initiatives are focused almost exclusively on GHG emissions. Although emissions should definitely be minimized, they must be correctly identified as the increments to the concentrations-based problem, not the problem itself. Ignoring this basic scientific fact is here called the *emissions fallacy* (see box).

The Emissions Fallacy

Assume that 350 ppm is the safe CO₂ concentration, the current level is 410 ppm, and the annual increase through emissions is 3 ppm. To return to 350 ppm, the logical approach would be to focus on removing the 60 ppm of unsafe CO₂ while also minimizing emissions. It would be illogical to focus instead on the emissions while largely ignoring the existing 60 ppm. The latter approach, which has long dominated policy discussions, is the emissions fallacy. For details see [this post](#).

Another key point is that "climate change" is a highly confusing misnomer for the various effects of unsafe GHGs. The climate is the first Earth system to be impacted by unsafe GHGs due to its relatively low mass, but this does not imply that it is the central problem. This becomes obvious when we carefully trace the effects of unsafe GHG, and if we use the terms "global warming" and "climate change" as defined in the [IPCC glossary](#).

As shown in the above diagram, the GHG crisis comprises several warming effects and one chemical effect. The warming effects are accurately called "global warming." This term is defined in the glossary as, "... the gradual increase ... in global surface temperature as one of the consequences of radiative forcing caused by anthropogenic emissions." In less technical language, it refers to the warming of the Earth's surface by the rise in GHG concentrations since the Industrial Revolution.

Global warming has one major and one minor impact. The major impact is the warming of the Earth's surface - especially the global ocean, which absorbs about 93% of the energy. The relatively minor impact is the warming of the atmosphere, which absorbs the remaining 7%. This warming makes a small contribution to climate change, and like ocean warming it occurs in the short term.

Next, the warming of ocean water causes deoxygenation in the short term and the bulk of climate change in the longer term. Deoxygenation, or oxygen depletion, occurs because oxygen is expelled from water when it is heated. Climate change, which the IPCC defines as a prolonged change in the state of the

climate, is predominantly caused by ocean heat that is released into the atmosphere after a delay of several decades. This delay is due to thermal inertia associated with the ocean's immense mass. Like a thick pan that takes several minutes to warm on a stove, the ocean warms slowly and releases its heat only gradually.

Another GHG impact is ocean acidification. Unlike global warming, which is caused by unsafe levels of all GHGs, ocean acidification is caused by unsafe levels of CO₂ alone. This is because acidification results from the chemical combination of CO₂ with seawater, which produces carbonic acid. The result to date has been an increase in the ocean's acidity by roughly 30% since the pre-industrial period. As with ocean warming, this impact is devastating to marine species and ecosystems.

At this point it should be clear why "climate change" is incorrect as a reference to the GHG crisis as a whole. Climate change, properly defined, is an *effect* of global and ocean warming rather than their cause, so it is not a primary or initiating event. As well, it has nothing to do with the chemistry of ocean acidification. If unsafe CO₂ levels did not change the climate, ocean acidification would still occur.

The only way out of this confusion is to coin a new term - such as my suggested "GHG crisis" - to refer to the full set of harmful GHG effects. The fact that this clearly indicated step has not been taken reveals the deceptive nature of today's environmental discourse. This topic is discussed further in section three below.

SECTION SUMMARY:

- Ecological overshoot occurred around 1950 when the global economy began to overwhelm the global environment.
- This triggered an ecological crisis that has two components: the emergency-level GHG crisis and the less urgent non-GHG impacts.
- The GHG crisis was caused by concentrations exceeding their safe levels.
- Reducing emissions as the main solution is illogical, and is here called the *emissions fallacy*.
- The GHG crisis comprises several warming effects and one chemical effect.
- The warming effects, which are caused by all GHGs, are global warming, ocean warming, ocean deoxygenation, and climate change.
- The chemical effect, which is caused by CO₂ alone, is ocean acidification.
- The use of "climate change" to refer to the GHG crisis as a whole is unscientific, illogical, and misleading.

2. THE RATIONAL RESPONSE

After more than half a century of human inaction, the ecological crisis has reached a perilous stage. Some tipping points have almost certainly been reached, others are imminent, and points-of-no-return are close behind. Much environmental damage has therefore been done, and much more will inevitably occur before the planet can return to a stable and sustainable state.

In this rapidly deteriorating situation it is important to specify the intended goal in tackling the crisis. As indicated by my title, I believe the appropriate human goal is ecological survival: the non-extinction of our species and the retention of organized human life. What is needed for present purposes, however, is an environmental specification: what is ecologically necessary to achieve this human end?

The goal that is regularly expressed by mainstream sources is *avoiding the worst consequences*. For example, this [New York Times article](#) tells us that, "In order to avoid the worst consequences of climate change, scientists say global temperatures must not increase more than 2 degrees Celsius." This is a disastrous formulation because the standard is far too low. The worst consequences of either the GHG or the ecological crisis are the destruction of life on Earth and the transformation of our blue planet into a Venus-like hell. But, even if this outcome is avoided by a wide margin, our civilization could still collapse and humankind could still perish if environmental degradation goes too far.

A far stricter and more survivable goal is this: *minimize the environmental damage we're currently doing, and repair the damage we've already done*. In other words, the correct aim is not to avoid the worst that is conceivable, but to achieve the best that is attainable. I call the two aspects of this best effort the *rational response* to the ecological crisis. When I talk about a solution, I am referring to one of the components of this response.

With these preliminaries out of the way, let me proceed to the rational response itself. This is summarized in the diagram below.

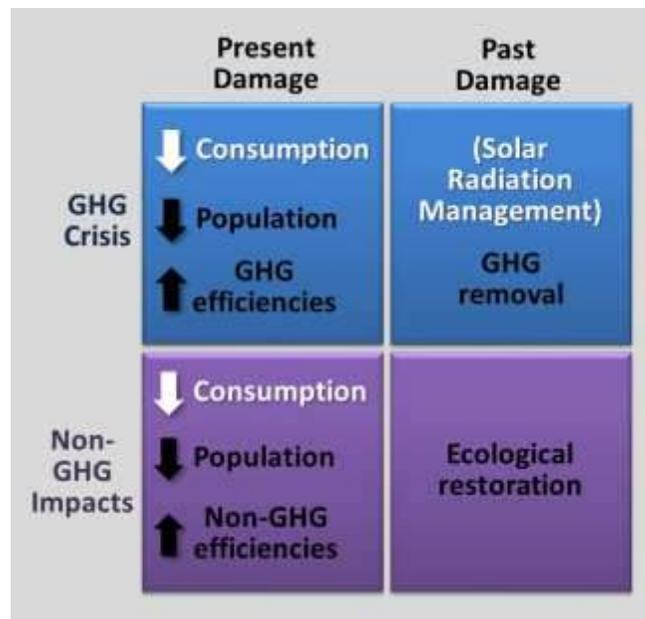


Figure 2 – The rational response to the ecological crisis

As explained in section one, the ecological crisis is divided into the GHG crisis and the various non-GHG impacts. These components are then split into the damage resulting from present and past economic activities. The applicable solutions are shown within the matrix itself. The white font indicates solutions that can be applied in the short term, and are therefore important for emergency action. "Solar radiation management" is in parentheses because this is a stopgap measure rather than a true solution.

For the GHG crisis our present damage is caused by GHG emissions. This is an environmental impact that can be analyzed through the [IPAT formula](#), which states that impact (I) is a function of population (P), affluence (A), and technology (T). Affluence here means average per-capita consumption, and technology means efficiencies. The formula therefore tells us that emissions rise when population and consumption levels increase, and drop when GHG-related efficiencies increase during production and consumption activities.

This means that emissions reductions can be achieved by the three factors shown: reduced population levels, reduced per-capita consumption, and increased GHG-related efficiencies. In contrast to current practice, where such reductions are tackled through improved efficiencies alone, *an effective program would include all three solutions*. Particularly important are reductions in population and consumption in the rich world. This is where much of the emissions-based damage originates, and where sharp decreases could rapidly reduce humankind's overall environmental damage.

Moving to the past damage caused by GHGs, the task is to restore the energy balance (see box) that has been lost through unsafe concentrations. There are two ways to achieve this. The first is to decrease the incoming heat by reflecting the Sun's rays, a process called solar radiation management, or SRM. The second is to increase the outgoing heat by decreasing GHG concentrations. This is called greenhouse gas removal, or GGR. (Historically this approach was limited to CO₂ and called CO₂ removal, or CDR.) Although the terminology is now shifting, the combination of SRM and GGR is commonly called geoengineering.

Energy Balance

The Earth is in energy balance when the energy flowing from the Sun to the Earth is equal to the energy flowing from the Earth into space. Excess GHGs block some of the escaping heat, resulting in an energy imbalance that is the cause of global warming. (For details see [this post](#) and [this Wikipedia article](#).)

Given that the GHG crisis is an emergency, decreased consumption is of particular importance because it is a short-term solution. A population decrease would require significant shifts in the patterns of births and deaths, which would take decades to unfold. Efficiency gains are being emphasized today, so major improvements are unlikely in the short term. Consumption, by contrast, is a behavioral factor that could change quickly if social attitudes were to radically shift. Most people in the rich world, for example, could stop flying tomorrow with minimal true hardship. (The unemployment that would result from reduced economic activities is addressed in section four.)

The other short-term measure for the GHG crisis is SRM. GGR fails to qualify because it requires extensive R&D, investments that will likely run to trillions of dollars, and a lengthy period while the excess gases are extracted and sequestered. This means that, although GGR is indispensable for returning GHG concentrations to their safe levels, it cannot achieve this end before environmental calamities occur. SRM, by contrast, could be implemented within weeks or months - especially with the stratospheric aerosol injection (SAI) method.

Of the five GHG solutions, SRM deserves our closest attention, for two reasons. First, it is the only short-term answer to the dire threat of runaway global warming. The method is controversial (see my discussion [here](#)), but there is simply no alternative for quickly slowing the Arctic meltdown and preventing catastrophic GHG releases. Second, SRM has been flagrantly misrepresented. Even respected climate scientists have erroneously portrayed it as a *techno-fix*: a technical method for solving global warming while emissions remain unchecked. This completely ignores SRM's rational application as a *techno-shield*: a stopgap measure to buy our species the time it needs to sharply curtail emissions and aggressively remove GHGs.

The second part of the rational response is to effectively address the various non-GHG impacts, albeit at a lower level of urgency than the GHG crisis.

Recall that the two overall aims are to minimize present damage and to repair past damage. For non-GHG impacts the first of these can be achieved by reducing our current impacts, so the IPAT formula again applies. Thus, similar to the GHG crisis, the short-term solution is reduced per-capita consumption, and the two long-term solutions are reduced population and increased non-GHG efficiencies. A good example of the latter is packaging, where the aim is to drastically reduce the amount of cardboard, plastic wrap, etc. used to protect goods. Another is recycling, which reuses manufactured materials and thus decreases the material inputs required to produce useful outputs.

Repairing the past damage from non-GHG impacts entails a range of measures referred to here as *ecological restoration*. Perhaps the most important measure is to rationalize land use by abandoning industrial agriculture, forestry, fishing, and livestock production, and to place tight restrictions on mining activities. Humankind must adopt far less destructive methods to reverse the habitat destruction and chemical toxification that are currently driving many species to extinction. Another critical measure is the Earth's rewilding: the return to nature of the land and ocean spaces that have been so destructively colonized by humankind. Finally, it will be necessary to remove wastes such as plastics from the ocean, pollutants from lakes and rivers, and industrial chemicals from landfills and dumps.

Humankind's rational response to the crisis has many components, but these can be reduced to two broad categories: *protect and restore*. Our species must first protect itself from runaway global warming through SRM. We must then restore the Earth-Sun energy balance and the integrity of lands, waters, and ecosystems. Protecting without restoring is not an option because SRM cannot shield the Earth indefinitely - it is a stopgap, not a solution. Conversely, restoring without protecting is impossible because organized human life would cease long before the clean-up is complete. Our ecological survival thus requires the adoption of a two-sided approach to the ecological crisis.

SECTION SUMMARY:

- The goal in tackling the ecological crisis is to minimize our current damage and to repair the damage we've already done.
- For the GHG crisis this means aggressively reducing emissions and quickly restoring the Earth-Sun energy balance.
- Emissions can be reduced through GHG efficiency improvements and by lowering population and consumption levels in the rich world. The energy balance can be restored through GGR.
- For non-GHG impacts the goal means reducing our overall impact plus ecological restoration.
- Overall impact can be reduced through non-GHG efficiency improvements and by lowering population and consumption levels. Ecological restoration can be achieved by rationalizing land use, reversing habitat destruction and chemical toxification, rewilding the Earth, and removing dangerous wastes.
- The most critical measure is SRM, which can act as a techno-shield to prevent runaway global warming while the other measures are implemented.

3. BLOCKING THE RATIONAL RESPONSE

Because the response outlined above has not been implemented, humankind faces an ecological crisis of existential proportions. Two questions must be answered if our species is to have a chance at ecological survival: WHY was meaningful action prevented, and HOW were the environmentally concerned persuaded to let it happen? (For more detailed discussions of both topics, see my series of posts starting [here](#).)

With respect to the "why" question, social leaders have long been aware of the impending crisis and thus the need for decisive action. Sporadic alarms about environmental decline were raised by scientists even during the 1950s, and in 1965 an advisory committee that included industry experts sent a comprehensive warning to US President Lyndon Johnson, who then informed Congress. This report, [Restoring the Quality of our Environment](#), describes a wide range of environmental problems, including air pollution, soil contamination, agricultural wastes, and rising CO2 levels. It candidly states that these problems will worsen with continued economic growth.

By the mid-1960s scientists also suspected that minor disturbances to the climate system could trigger massive and catastrophic changes. Already in 1925 a climate scientist had proposed that the polar regions have only two stable states - fully frozen and fully melted - and can flip between them from a "slight perturbation". (Spencer Weart, [The Discovery of Global Warming](#), p. 49) This suspicion was strengthened during the 1950s and 1960s, and in the 1980s it was confirmed. (Weart, p. 134) The same is true for the thermohaline circulation (see box), which has major climate impacts. Leading figures have therefore known for decades not only that ecological overshoot has occurred, but also that human civilization is imperilled by hair-trigger tipping points in the climate system.

Thermohaline Circulation

Also called the "ocean conveyor belt," this is the large-scale ocean circulation caused by differences in water density at different ocean levels. These differences arise from variations in the water's temperature ("thermo") and salt content ("haline"). (For details see [this Wikipedia article](#).)

The rational response to the crisis was nevertheless blocked, for two main reasons. The first and more fundamental of these is that it would threaten capitalism and growth. These systemic threats become clear when we examine the solutions to the GHG crisis from the economic and political perspectives. As indicated in figure 2, there are five possible solutions: increased GHG-related efficiencies, reduced population levels, reduced consumption levels, SRM, and GGR. The systemic threats are associated with the last four of these.

SRM and GGR are problematic because their wholesale adoption would be an implicit admission that the GHG crisis is both real and extremely serious. For capitalism's supporters this would be a humiliating surrender to the environmentally concerned and an admission that strict regulation is unavoidable. Of even greater significance is that large-scale interventions in the environment would reveal that capitalism's relentless expansion has transgressed planetary boundaries and caused widespread ecological damage. This could undermine public confidence in the system, thereby jeopardizing its future.

Whereas SRM and GGR are "public relations" problems for the system and its supporters, reducing population and consumption levels would concretely threaten growth. Economic expansion relies on increases in both factors, so a growth-dependent economy cannot reduce either without causing severe

economic dislocations. By contrast, efficiency improvements are to some degree consistent with capitalist logic. (For details on this logic, see the [appendix](#)). This is why they are willingly implemented whenever they result in higher profits, and why such improvements are the only component of the solutions space that is widely embraced.

The second fundamental reason for blocking the rational response is that the material interests of the global rich are aligned with economic expansion rather than sustainability. Achieving the latter would mean dramatically reduced consumption levels, thereby threatening the most bountiful lifestyles in history. Given the realities of human nature, such changes are strongly resisted. This means that the global rich - whether they are young or old, socially rich or socially poor - will tend to embrace efficiency gains because they don't rock the lifestyle boat, but to dismiss the other two measures because they imply painful material losses. SRM and GGR are similarly resisted because they could destabilize the system that underlies rich-world privileges.

Regarding the "how" question, social leaders have devised a highly effective strategy for diverting attention away from the rational response and fixing the public gaze on emissions reductions alone. Briefly stated, the steps are to distort the crisis, authoritatively acknowledge this distorted version, and then deny all system-threatening solutions. The main social instrument used to implement this strategy has been the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988.

The ecological crisis was distorted in two ways. First, the IPCC name itself refers exclusively to climate effects, although it was well understood by the 1980s that the underlying problem is ecological overshoot, which includes non-GHG impacts. Second, these effects were referred to as climate change rather than the GHG crisis or a similar comprehensive term. As noted above, this is highly misleading because a changing climate is one of several consequences of global warming, and it excludes ocean acidification. Based on these distortions, the world has for decades addressed a sharply diminished crisis in outrageously muddled terms.

Despite its deceptive birth, the IPCC quickly gained the public's confidence through its association with competent scientists, its detailed technical reports, the daily plaudits it received from mainstream and progressive sources, and in 2007 its shared Nobel Peace Prize. Most significant, however, was its correct insistence that the GHG crisis is real and serious, and that the deniers are unscientific obstructionists. This posture was highly appealing to the concerned and drew them tightly into the IPCC's ambit.

Once ensnared in this fashion, however, the concerned were fed the falsehoods that make up today's standard climate story: reduce GHG emissions instead of concentrations, dismiss SRM as a crazy techno-fix, delay GGR by several decades, and ignore both population and consumption reductions in the solutions mix. The strategy is thus a variant of bait-and-switch: attract the concerned with an authoritative and respected organization, and then divert them to a highly restricted solutions set that preserves capitalism, growth, and the lifestyles of the global affluent.

This approach - admit the problems but deny any threatening solutions - has been highly successful because it is based on sound human psychology. The problems are objective realities that directly impact the populace and can therefore be denied only by the true fanatics. The solutions, however, are in the realm of human thought, which is easily manipulated by social leaders. For example, the replacement of safe GHG concentrations with net-zero emissions as the GHG goal is logically absurd. It was nevertheless achieved through the IPCC's exclusive use of emission scenarios in its analyses, and by the mantra-like repetition of the word "emissions" instead of "concentrations" in its reports. For

example, the ratio between the two words in several major documents, including the Paris Agreement, is 104-2 in favor of "emissions".

Before leaving this topic I must note one final deception because of its recent relevance. As the GHG crisis intensifies, the standard story becomes increasingly dubious and thus suspect. The above strategy must therefore be adjusted as time goes on. This is most easily achieved by broadening the IPCC's problem acknowledgment to match the public's deepening concerns. This was likely the main rationale for the organization's [1.5°C report](#). Given the disasters being experienced at just over 1°C of warming, the longstanding 2°C limit was rapidly losing credibility. The 1.5° C limit demanded by island nations was therefore adopted, although no real change was made on the solutions side - just faster implementation of the conventional steps. Assisted by the compliant media, this new manipulation has been quite successful. For a more detailed analysis of this subterfuge, see [this post](#).

SECTION SUMMARY:

- Although the main environmental threats were understood by 1965, the rational response was prevented because it threatened the capitalist system, economic growth, and the material interests of the global rich.
- This prevention was achieved by reducing the ecological crisis from overshoot to "climate change" (the GHG crisis), acknowledging the latter to attract the concerned, and then restricting solutions to those that pose no systemic or lifestyle threats.
- The main instrument of this deception has been the IPCC, which correctly recognizes the GHG crisis as a serious threat but fixates on efficiency improvements as the main response. This means that four of the five possible solutions to the GHG crisis - reduced population, reduced consumption, SRM, and GGR - have been sidelined or marginalized.
- The likely intent of the IPCC's 1.5° C report was to neutralize heightened public concern by broadening the organization's problem acknowledgment while leaving the solutions largely unchanged.

Before moving to the second part of this document, let me summarize the above. Around 1950 capitalism's relentless economic expansion caused ecological overshoot. This triggered an ecological crisis that has two components: the GHG crisis and various non-GHG impacts. The rational response to this crisis includes a range of measures to minimize our current damage and to repair the damage we've already done. This response was blocked because it would threaten capitalism, growth, and rich-country lifestyles. The IPCC was established in 1988 to mask this inaction by reducing ecological overshoot to "climate change", acknowledging this crisis and opposing the deniers, and then rejecting any threatening solutions. Below I propose an economic and political strategy to overcome this inaction and hopefully achieve a sustainable world.

B. ECOLOGICAL SURVIVAL

1. FROM CAPITALISM TO A SUSTAINABLE ECONOMY

In section three I outlined the rational response to the ecological crisis. However, many of the proposed solutions are incompatible with the capitalist system. For continued economic growth, population and consumption levels must increase, not decline. Efficiency improvements will always be hampered by the growth-inflamed drive for profits. And, because full implementation of SRM and GGR could expose capitalism's role in ecological overshoot, these measures are strongly resisted. The inescapable conclusion is that, to fully implement the rational response, capitalism must be quickly transformed into a sustainable economic system. In this section I outline this transformation and how it could be achieved.

As described in my introduction, capitalism arose through a technology-driven transition from the land-based feudal economy. This process took centuries to unfold. During this time the economic institutions and social relations of the medieval period were gradually replaced by those of the capitalist order, and an economic theory was developed to support the new system's growth-dependent logic. Given today's rapid destruction of the global environment, this languid pace is unavailable to us. What capitalism achieved over several centuries must now be completed within years or possibly a few decades. A new model for fundamental economic change is therefore required.

In my view this model has two components. The first is a social force with sufficient authority and coercive power to rapidly shift the economy onto a sustainable path. This is a political topic that is addressed in section five below. The second is an economic theory that can offer conceptual and practical guidance to this social force during the restructuring process.

Today's dominant theory, known as standard or neoclassical economics, is useful for analyzing market behavior, but it slavishly reflects capitalism's economic logic and is therefore ill-suited to the restructuring task. Its main alternative, ecological economics, has a massive contradiction at its core: it rejects unsustainable growth, but it clings to unsustainably growing capitalism. The field also made an egregious error when it ignored Herman Daly's warning to avoid the standard concept of subjective use-value because of its disastrous environmental implications (see box). Based on these and other deficiencies, ecological economics must also be rejected as the new economic theory.

In the early 1990s, after realizing that neither standard nor ecological economics would suffice, I began to develop the required theory on my own. The eventual result was the Economics of Needs and Limits, or ENL. This conceptual framework is based on an ethical principle: *all human beings, present and future, are of high and equal worth*. Rather than

Daly's Ignored Warning

Herman Daly was one of the founders of ecological economics in the late 1980s. In his book [Steady-State Economics](#) (1977) he had criticized the standard discipline for defining use-value in terms of subjective wants instead of objective needs. His warning was that, "Since subjective individual wants are considered infinite as well as sovereign, there is a tendency for the scale of activity devoted to satisfying them continually to expand." (p. 213) In other words, subjective value has the potential to be environmentally destructive. Despite this caution by the field's most prestigious thinker, ecological economics adopted subjective value as a core principle.

repeating the blunder of ecological economics, ENL defines both value and cost in objective terms. This reflects the objective nature of environmental limits, human consumption needs, and the damage to workers in production.

As noted above, the new economic theory must provide both conceptual and practical guidance. ENL achieves the first by offering sustainable and human-centered approaches to the core economic sequence: allocation, production, distribution, and consumption. The aim at each stage is maximum well-being, which is defined in terms of physical health and the satisfaction of genuine (unmanipulated) wants. Outputs are granted environmental resources only to the extent that they serve this end, and overall environmental limits are strictly observed. ENL provides practical guidance by offering a set of analytical tools based on this perspective. Given sufficient theoretical development, these tools could be used to establish rational objectives for the full range of economic activities.

Although ENL is the product of a single mind and is therefore immature, it could serve as a useful starting point for a robust economic theory for sustainability. For a detailed description, see [this book](#) (Kindle or paperback) or [this free PDF](#). Also available are an [overview](#) (to come) and a more detailed [introduction](#).

Once an ENL-like framework and a qualified social force are in place, the transition to a sustainable economy becomes feasible. To facilitate this transition, I propose the principle of *minimum effective change*. This retains as much of capitalism as is consistent with sustainable well-being, thereby minimizing the social resistance to this deeply disruptive shift. For example, properly regulated markets and private economic ownership are potentially consistent with ENL's aims, and should therefore be retained in suitable forms. Capitalism's two critical weaknesses are its innate growth compulsion and its tendency towards excessive inequality. The transition should seek to remove these defects while objectively evaluating the system's useful features for incorporation into its sustainable replacement.

Another important way to minimize social resistance is to avoid the unemployment that under capitalism would result from reduced economic activities. In ENL this issue is addressed by treating workers not just as inputs to production, but also as human beings whose well-being must be maximized. Applying this perspective, the framework's logic distributes labor fairly among available workers and compensates for reduced activities by shortening the work-week. This solution has been proposed by many others, but here it is derived from first principles and formal analysis. In this context it is not just a good idea socially and environmentally, it is *economically rational*.

Beyond a qualified social force, a new economic theory, and minimal resistance, the post-capitalist transition will require numerous institutional innovations. For example, new institutions will be needed to establish rational economic objectives and to carefully allocate environmental sources and sinks. Existing institutions will have to be modified to monitor environmental performance and to strictly enforce environmental regulations. As well, a reformed labor market must be developed to fully recognize workers as both labor inputs and human beings. For these and other tasks, extensive intellectual work will be required. It will therefore be necessary to re-orient many social thinkers from their current projects to the economic transition. A list of possible research areas can be found [here](#).

Because the ecological crisis confronts humankind with a sharp historical discontinuity, the nature of a post-capitalist economy cannot be foreseen. That is, we cannot move towards a specific system such as socialism. Instead we must move away from capitalism under the guidance of sustainable economic principles. This means that a post-expansionary economy will be the unknowable outcome of a rapid, organic, and theory-driven process.

NOTE: For details on the economic logic of capitalism and how it compares with that of ENL, see the [appendix](#).

SECTION SUMMARY:

- Because the rational response to the ecological crisis cannot be implemented under capitalism, the world must quickly transition to a sustainable economy. The primary requirements for this transition are a qualified social force, a new economic theory such as ENL, and the minimization of social resistance.
- An important way to achieve the latter is to observe the principle of minimum effective change, which alters capitalism only as required for sustainable well-being. Another is to modify the labor market so that reduced economic activities result in a shorter work week instead of unemployed workers.
- Extensive intellectual work will be required to create suitable economic institutions and to adapt existing institutions to post-capitalist realities.

2. THE NECESSITY OF REVOLUTIONARY CHANGE

A central fact about the ecological crisis is that humankind's solutions must be proportionate to the problems we have caused. Because the problems are massive, the solutions must be massive as well. This is true in the ecological sphere, where extensive destruction over several centuries must now be addressed by vast geoengineering projects. It is also true in the economic sphere, where the longstanding capitalist system must be shunted off the historical stage and replaced by a sustainable economy.

And it applies to the political sphere as well. Today's expansionary leadership cannot be reformed, but must instead be replaced by a group that can implement the rational ecological response and guide the required economic transformation.

Given the profound social repercussions of this radical shift and the fierce opposition it will undoubtedly provoke, I would like to present three additional arguments to establish its iron-clad necessity. The first relates to alternative solutions to the GHG crisis, the second to the political realities of capitalist societies, and the third to the redirection of our species from expansion to contraction. The alternative GHG solutions are depicted in Figure 3 – Two futures for CO₂ concentration.

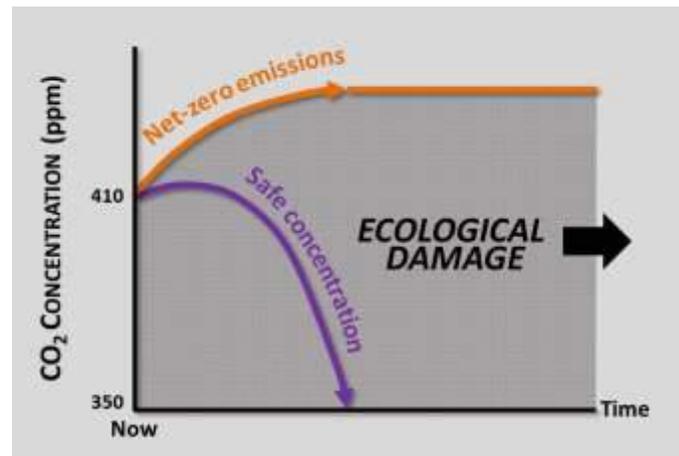


Figure 3 – Two futures for CO₂ concentration

Like the [Keeling curve](#), this graph depicts changes to the atmosphere's CO₂ concentration over time. The top curve represents the conventional approach of decarbonizing the economy within a specified timeframe. The goal of net-zero emissions is thus achieved within a few decades. The intent of this approach is to stabilize the concentration level in order to limit global warming to 1.5°C or 2°C. The bottom curve represents the safe-concentration approach that is part of the rational response.

What is noteworthy about the net-zero approach is that, although it cannot conceivably solve the GHG crisis, mainstream sources see it as unrealistically aggressive and thus virtually impossible to achieve. This strongly indicates that the required solutions cannot be implemented within the prevailing order. Let me substantiate this important claim.

The net-zero approach is inadequate because, as stated in the IPCC's [1.5°C report](#) (p. SPM-8), ecological damage is a function of the rate, peak and *duration* of global warming. Warming is proportional to the CO₂ concentration, so the damage caused is proportional to the areas under the two curves. The graph therefore indicates that the damage associated with net-zero emissions is immense and grows rapidly over time. Adopting this approach thus guarantees that calamitous tipping points and points-of-no-return will soon be encountered.

The view that net-zero emissions is almost impossible to achieve has been expressed by numerous mainstream sources. One is the 1.5°C report itself, which tells us that staying under this limit will require "rapid and unprecedented societal transformation." Another is the [Hothouse Earth](#) report, which states that even the two-degree limit implies "a fundamental change in the role of humans on the planet."

The authors also state that modest economic changes won't suffice, and that, "Widespread, rapid, and fundamental transformations will likely be required ... ". A third source is the [Losing Earth](#) article in the New York Times, which suggests that staying under the two-degree limit "will take a revolution."

To restate my earlier conclusion: if a patently inadequate approach to the GHG crisis will almost certainly take capitalism beyond the limits of its adaptability, the vastly more ambitious safe-concentration approach can be achieved only through revolutionary change. The diagram above thus represents two distinct social realities. This conclusion is supported by the IPCC's mitigation proposals. These provide emission scenarios that offer policymakers variations on the disastrous but capitalism-friendly upper curve, but completely ignore the promising but system-threatening bottom curve.

My second argument to establish the necessity of revolutionary change relates to the political structure of capitalist societies, a crucial topic that is discussed in more detail [here](#). The standard story is that these societies are ruled by governments, which are elected by the people. Thus, if the people can be persuaded that the crisis is a grave threat, they will pressure their elected representatives to implement an effective response. Although this story is widely accepted by the environmentally concerned, it is demonstrably false.

As noted in my introduction, today's capitalist societies arose from European feudalism, a system dominated in each country by a landowning class. As manufacturing flourished after the 16th century, the rising capitalists gradually replaced the landowners as society's ruling force. It must be carefully noted, however, that *at no point during this historical process was political power transferred to the people*. On the contrary, historian Eric Hobsbawm has found that the British people were granted parliamentary rights only after capitalist power had been fully entrenched and the working class was no longer a threat to its rule. The Times of London rejected even this restricted freedom until 1914, when working-class support was needed for the war effort. ([Industry and Empire](#), p. 125n)

The true role of government is to represent the people's views and interests in order to make relatively minor adjustments *within the prevailing social order*. If a government instead initiates far-reaching changes that threaten this order - such as the replacement of capitalism with a sustainable economy - it will be quickly undermined and removed from office. History is replete with [examples](#), including the [Iranian coup](#) in 1953, the [Chilean coup](#) in 1973, and the [Egyptian coup](#) in 2013. In each case a democratically elected government was deposed by armed force when its actions threatened the real but hidden rulers.

I should add that no country is immune from such power seizures - including the United States. In the 1930s American business leaders were horrified by the "creeping socialism" of Roosevelt's New Deal and tried to replace him with a military figurehead. This failed only because Smedley Butler, the chosen pretender, refused to betray his fellow soldiers and citizens. (See box.)

An Abortive American Coup

When the sick and overburdened FDR introduced his New Deal in the 1930s, wealthy business leaders tried to reduce him to a figurehead by giving presidential authority to a "Secretary of General Affairs". The plan was for war hero Smedley Butler to fill this role while FDR was shunted aside. Butler instead terminated the plot by revealing it to journalists and Congress. Central to this takeover attempt was the American Liberty League, a right-wing organization spearheaded by the Dupont and J.P. Morgan families. For the full story, see Jules Archer's [The Plot to Seize the White House](#).

Various terms are used to refer to society's dominant figures. Among them are the 1%, the elite, the oligarchy, the establishment, and the ruling class. I prefer the latter because it is used in some

intellectual circles and is politically the most accurate. However, agreement on this point is not essential, so I will use the neutral term "social leadership". This is also broad enough to cover China's leadership, which has copied capitalism's disastrous growth model and must also be removed from power.

Briefly stated, it is futile to pressure governments to make the profound economic changes that are now required. Therefore the initial step must be the replacement of the existing, expansionary social leadership with a sustainable alternative - that is, revolutionary change. Once this is achieved, government can play a constructive role by ensuring that the people are adequately represented during the difficult transition to a sustainable society.

Although revolutionary change will cause immense social disorder, this will likely be less painful than the indescribable chaos that will result from ecological collapse. Revolutionary change is a conscious strategy that could result in a sustainable future for humankind. Ecological collapse is an undirected destruction that will inevitably result in a massive human die-off and the disintegration of our societies and civilization. At this stage there is no painless route to a sustainable world. All we can do is minimize the suffering as we try to prolong our stay on this beautiful planet.

My last argument for revolutionary change is that this is an essential component of what might be called *species redirection*. Because humankind has violated the Earth's environmental limits, our survival depends on the abrupt shift in our ecological trajectory from expansion to contraction. This means that some aspects of human nature must be suppressed while others are bolstered. We must, in a very real sense, transform ourselves into an entirely *new species*. This transformation entails a comprehensive reorientation of our societies, economies, and political structures, and is therefore unprecedented in depth and scope. Driving such change is possible only for a social leadership that is fully committed to the sustainability project. Because current social leaders clearly fail to qualify, they must be replaced by suitable alternatives.

Some scientists are now speculating that species redirection is a universal challenge. In his book [*Light of the Stars*](#) astrophysicist Adam Frank claims that technologically advanced civilizations like ours are extremely common over cosmic space and time. Such civilizations must harvest copious energy and thus produce copious wastes, so they have likely faced an overshoot crisis themselves. It is therefore possible that the solution to [the Fermi paradox](#) (if aliens are common then where are they?) is that most species in this predicament were unable to shift their ecological trajectories in time. If Frank is right, it is now our turn to answer a cosmic question: are we sufficiently adaptable to reverse our deadly expansion and to live within the Earth's natural limits?

SECTION SUMMARY:

- My assertion that capitalist societies must undergo revolutionary change is based on four arguments:
 1. Humankind's solution to the ecological crisis must be proportionate to the problem. Politically this implies the replacement of the current social leadership with a sustainable group.
 2. Mainstream sources correctly claim that reaching net-zero emissions will require transformative social change. It is therefore clear that the vastly more ambitious safe-concentration approach will require a revolutionary shift.
 3. Political analysis firmly establishes that capitalist societies are ruled not by their people or governments, but by dominant groups that derive their power from economic ownership and control. Pressuring governments for fundamental change is therefore pointless and self-defeating.
 4. Revolutionary change is the first step in species redirection: humankind's ecological shift from an expansionary to a contractionary trajectory.
- Although the social disorder resulting from revolutionary change will be immense, this will be preferable to the indescribably chaos that will result from uncontrolled ecological collapse.

3. THE YOUTH-MILITARY STRATEGY

Given that revolutionary change is necessary for humankind's ecological survival, how can it be achieved? This is a difficult question because societies are structured for their indefinite continuation, not their radical transformation. The standard modes of change - cultural evolution, corporate initiatives, government policies, etc. - can modify a society within limits, but they cannot transform it in any substantial way. A mode of change that departs from conventional formulas must therefore be identified.

To establish what this might be, it is useful to examine past revolutions and draw conclusions that are relevant today. One such conclusion is that revolutionary change is possible only if deep and visceral anger is currently being felt towards existing social leaders and arrangements. Marx and Lenin were able to direct working-class rage into revolutionary channels, but only because that rage had already been implanted by gruesome industrial conditions. A second important conclusion is that a social entity with the capacity to forcibly depose the current leaders must currently exist. Any social leadership ultimately depends on force to maintain its rule, so a coercive power must be available to overcome this force. The social entity must currently exist due to ecological time constraints.

Based on these historical lessons, I propose a model for revolutionary change that relies on the young for the visceral anger and revolutionary energy, and that uses the coercive power of the military to depose the current social leadership. See figure 4 below.

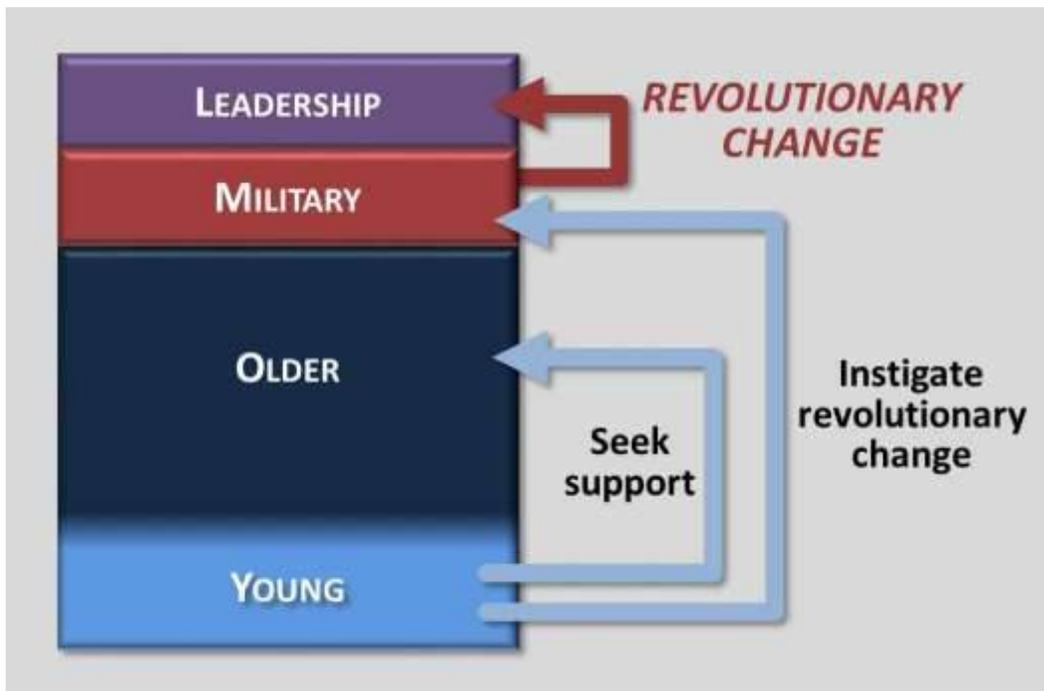


Figure 4 – The youth military strategy for revolutionary change

This is a highly simplified representation of a capitalist society in that it depicts only those elements that are relevant to revolutionary change. At top is the social leadership, which exercises its dominance through a set of methods called *social control*. Next is the military - the social entity that must apply the necessary force. Below the military is the populace, which is split into the young and the older. The

young are those who have the most to lose from the rapidly degrading environment - that is, those who are below about thirty years of age. For want of a better term, all other members of the populace are here called the "older".

Today's young are historically unique for two reasons. First, theirs is the first and perhaps only generation that will fully experience the brutal realities of environmental decline. Baby boomers like me can fear for the future, but at a visceral level we cannot grasp what it means to plunge headlong into the ecological abyss. Second, many among the young will not only suffer and die before their time, they will see with terrifying clarity that both humankind and nature are in terminal states. Their decision to have children will therefore become an increasingly cruel and unethical choice. Previous generations had the consolation that their deaths were mere episodes in the continuity of human and non-human life. No such solace is available to the young today.

In addition to these sources of anger, the young have a high level of energy, are naturally rebellious towards their elders, communicate effectively using current technologies, and are largely free from work and child-raising responsibilities. The overall effect, I suggest, is to place the young in a position that is roughly analogous to the revolutionary working class of the early industrial period.

Regarding the older, their most significant collective attribute is their refusal to implement the rational crisis response. Although they have been aware for decades that economic activities are pushing the Earth towards disaster, they have done nothing of substance to halt or even slow the decline. In effect, the older have balanced their self-interest against the interests of the young and the biosphere, and have decided in favor of their self-interest. Aside from social control, this appears to be the core reason for their persistent inaction over the past fifty years.

Despite this shameful collective behavior, many individuals in this age group are deeply concerned about the young, the environment, and the future. As well, they possess a store of knowledge and experience that will be indispensable during the economic transition. The young must therefore treat the older with strategic ambivalence. As a group they will not abandon their material comforts and safeguard the environment, but as individuals some will likely step forward to help instigate military intervention and manage the economic transition. This is the support being sought by the young in the above diagram.

Let me now address the pivotal element in this strategy - the military. As indicated above, deposing the current leadership is possible only for a social entity with the required coercive capacity. In addition, however, it must have the will to apply this capacity to the revolutionary task. There is little doubt that most militaries have the equipment, training, and discipline to exert the necessary force. What must be questioned is their potential will.

Two key factors are at play here. The first is the military's environmental awareness: does it adequately understand the existential gravity of the current situation? The second is its ultimate loyalty: given that the interests of the people and their leaders have sharply diverged, which will the military choose to serve?

These questions can to some degree to be answered for the American military. In 2015 the US Department of Defense published a set of [documents](#) about its environmental posture. These reveal that the US military fully recognizes that, "Climate change is real, serious, and inescapable, and its looming effects ... may prove to be destabilizing on a massive scale." Further, they acknowledge that climate change tipping points have, "... a real potential to wipe out a majority of the population and species on

the planet.” Unfortunately the documents also embrace the emissions fallacy, downplay the Arctic emergency, and perceive geoengineering exclusively as a potential threat by rogue actors, thereby ignoring its essential role in humankind’s ecological survival.

Regarding its loyalty, the good news is that the US military sees itself as representing the American nation – that is, the collective interests of the American people. The bad news is that it identifies strongly with capitalism and the current social leadership. This is evident from its concern that an inadequate response to the crisis will stifle economic growth and undermine, “... the Western model of economic development and democracy”.

To the degree that these perceptions are typical, the world's militaries understand the gravity of the crisis, but embrace the standard errors about its nature and solutions. They also recognize their ultimate responsibility to the people, but unfortunately retain their longstanding allegiance to current leaders.

Based on these tentative conclusions, the young should consider two approaches in their instigation efforts. The first is to praise the military's environmental sensitivity while correcting its misconceptions and directing it towards the rational response. The second is to emphasize its responsibility to both the people and the national territory - which is now being "invaded" by rising seas and damaged by rising temperatures. The young must convince the military that its only honorable course is to transfer its allegiance from the current social leadership to the people it ultimately serves. This argument could become highly persuasive as the crisis escalates.

If the military responds positively to these pleas, it could replace the current leadership in one of two ways, depending on circumstances. If a sustainable civilian group with sufficient political maturity is available, the military could remain in the background while supporting this group as the new leaders. This is indirect military intervention. If no such group yet exists, the military could assume power itself with the intention of re-establishing civilian rule as soon as this is feasible. This is direct military intervention. Given that sustainable civilian groups are not yet visible in today's societies, direct military intervention seems unavoidable. Perhaps, with sufficient pressure from the young and supportive old, such groups can quickly form and mature, thereby shortening the period of direct military control.

Besides preventing ecological disaster, there are two other compelling reasons for persuading the military to supplant the current social leadership. The first is that, given its existing loyalties, the military will likely support a fascist takeover if the populace becomes unmanageable during ecological decline. The intervention I propose would be part of a shift in military allegiance towards the people, thereby making this political nightmare less likely. The second reason is that an effective ecological response, driven by military intervention, may be the only way to prevent nuclear war. International tensions will soar if food becomes scarce and mass migrations escalate. Substantial progress towards a livable environment would therefore be a major contribution to a future without nuclear conflict.

Let me end this section by clearly distinguishing between revolutionary change and the military coups discussed in the previous section. Revolutionary change refers to the replacement of the current social leadership with a sustainable alternative in order to implement the rational response to the ecological crisis. The purpose of the military coups was to keep the current social leadership in power by removing non-compliant governments. Military force is used in both cases, but the social entities involved and the intended outcomes are entirely distinct.

SECTION SUMMARY:

- Revolutionary change requires intense anger and energy, plus a social entity that can forcibly depose the existing social leadership. In the youth-military strategy the young supply the anger and energy, and the military supplies the force.
- As a group, the older have consistently dismissed the rational response to the ecological crisis. However, they possess valuable knowledge and experience, and many concerned individuals will support the young in their bid for ecological survival.
- The military appears to understand the environmental threat, but it also embraces the standard misconceptions. The young should therefore educate the military about environmental realities and underscore its professional duty towards the people.
- If a sustainable civilian group exists, indirect military intervention will be possible. If no such group has appeared, direct intervention will be required.
- Two additional reasons to shift military loyalties are to prevent a fascist takeover and to minimize the risk of nuclear war.

CONCLUDING COMMENTS

In late 2018 Swedish climate activist Greta Thunberg stood before a Stockholm audience and delivered a forceful [presentation](#). The 15-year-old expressed amazement that, despite widespread talk of an existential crisis, no-one is acting as if a crisis actually exists. She also insisted that today's rules won't save the world, so these rules must be changed. Her activist approach - school strike for climate - is now being copied by students around the world.

Although this youth movement is an exciting and necessary development, it is deeply marred by the fact that Thunberg and her followers have embraced the standard GHG story. For them the problem is emissions, the solution is renewable energy, and the agents of change are politicians and governments. It is therefore possible that, although millions of fired-up students will soon hit the streets, their horrific futures will remain unchanged because of the lies and distortions they have absorbed. To avert this tragic outcome the young must quickly repudiate the many falsehoods and decisively forge an independent path.

The first lesson they must learn is that "changing the rules" means far more than eliminating fossil fuels - it means replacing the current social leadership and moving from capitalism to a sustainable economic system. The core requirement for a liveable world is not political will within the prevailing social order, but the political power to create a new and sustainable social order. *Ecological survival demands revolutionary change.*

Another critical lesson for the young is that the falsehoods go far deeper than they realize. The IPCC is not just a conservative organization that is hamstrung by a clumsy review process - it is instead a deliberate stratagem by social leaders to absorb concerns and deny threatening solutions. The primary reason that SRM is dismissed is not that it is risky, but because its large-scale adoption might expose capitalism's role in ecological overshoot, thereby killing the goose that lays the golden eggs.

The third and most difficult lesson is that the older are far less virtuous than the young might think. In her presentation Thunberg rhetorically asked, "Are we evil?" She answered with an emphatic no, explaining that most people don't understand the crisis and the drastic changes required. But many people - particularly social leaders and their well-informed supporters - have understood all this for decades. They nevertheless remain fervent supporters of a life-destroying economic system because they have made an obscene ethical decision: *our present is worth more than your future*. This means that, to a shocking degree, the older are evil. Youth strategies that ignore this grim reality are bound to fail.

My final point is this: Any approach that could succeed in salvaging the biosphere will necessarily be unorthodox and thus appear strange and even shocking. The ecological crisis is now so far advanced that only massive and unfamiliar actions will pull us back from the brink. My proposal for revolutionary change must be assessed in this terrifying context. As a corollary, any approach that feels comfortably familiar cannot possibly work. "Bold" government policies and clean-energy initiatives can thus be dismissed out of hand. Far from being enlightened solutions, such measures reflect the cynical manipulations of a social force that must now be replaced by a sustainable alternative.

APPENDIX: CAPITALIST LOGIC AND ENL LOGIC

As stated above, humankind must quickly shift from capitalism to a sustainable economy under the guidance of a conceptual framework such as ENL. Because this shift is central to our ecological survival, I would like to probe it more deeply by examining the *economic logic* that underlies each system. This term refers to the various factors that drive an economy's allocation decisions, its distribution patterns, and its production and consumption activities. The economic logic of capitalism is depicted in the figure below.



Figure 1 – Capitalist logic

There are six factors in all. The most important of these is the profit-driven goal of maximum economic growth. Supporting this goal are two ecological factors: the assumptions of infinite natural sources and infinite natural sinks. Also supporting the goal are three social factors. First, workers are treated exclusively as labor inputs, as opposed to human beings who provide labor. Second, the populace is treated exclusively as consumers, as opposed to human beings who consume. Third, the economy's output mix (the types and quantities of outputs produced) is determined by affordable desire - that is, consumption desires that are backed by the purchasing power of money.

The significance of the logic's goal and environmental assumptions is that they are responsible for ecological overshoot and thus the crisis we face today. The environment is far from limitless, and economic growth is justified only if it improves well-being. However, this also implies that the logic is rational under specific conditions. If natural sources are abundant, natural sinks are largely intact, and people are suffering in poverty, this logic is probably the most effective way to improve their lives.

Thus, based on the ecological factors, the problem is not capitalist logic per se but rather its continued employment when these conditions no longer apply.

The significance of the logic's three social factors is that they degrade the populace. Treating workers exclusively as labor inputs ignores the effects of labor on their health and life enjoyment. Examples are automation that robs them of skills and creativity, and work intensification that leaves them exhausted and accident-prone. Treating the populace exclusively as consumers ignores the effects of consumption on their lives. Some consumption enhances health or provides enjoyment, but other consumption causes substantial harm. Finally, determining an economy's output mix through affordable desire means that production will be heavily skewed towards the wants of rich while marginalizing the needs of the poor.

Based on this clarification of capitalist logic, several important points can be made:

- The economic logic of any complex economy is implemented through a mix of markets and state control. Under capitalism, markets and state serve capitalist ends. Under a different economic system, with a different social leadership, they would serve different ends. This is an important point because the concerned frequently see the market as an enemy and the state as a friend or potential friend. However, the critical factors are not these entities themselves, but rather the economic and political contexts in which they operate.

NOTE: Although they are distinct, state and government are frequently conflated. "State" refers to the organizations and institutions authorized by social leaders to regulate social functioning. "Government" refers to the elected politicians that represent the populace's views and concerns. Based on its delegated authority, the state is dominant. The capitalist state will therefore dilute or ignore any government actions that seriously conflict with capitalist ends.

- The application of capitalist logic varies widely based on historical and social factors. Capitalist economies thus show marked differences in their environmental and social attributes. This is clearly exemplified by the disparities between two capitalist countries: Norway and the United States.
- Unmodified capitalist logic cannot achieve well-being for the majority. Workers would be exploited far beyond their physical and mental capacities, and consumer health would be gravely impaired by harmful outputs. General well-being under this logic is possible only if it is extensively modified through social pressures. This is why neoliberalism ("market fundamentalism") is so dangerous: it reverses these modifications, thereby exposing both humankind and nature to the brutalities of raw capitalist logic.
- Because capitalist logic aims for maximum growth and assumes infinite natural sinks, it leads inexorably to ecological collapse. Although modifications to the logic can delay this disaster, it cannot be permanently avoided. ***This means that capitalism, in any form, is incompatible with a sustainable future.***
- Two important social movements have arisen to counter the dangers posed by capitalist logic: progressivism and environmentalism. The first is a response to the logic's social destructiveness. The second is a response to its ecological destructiveness. Based on my previous two points, the crucial difference between them is that progressivism's enemy is unmodified capitalist logic, whereas environmentalism's enemy is the logic itself. This means that progressivism, because it accepts capitalism's constraints on social justice, is a reform movement. Environmentalism, on

the other hand, must be revolutionary to achieve sustainability. It is therefore tragic that the two have essentially merged under the progressive banner. Revolutionary change is thereby blocked, capitalist logic is further entrenched, and the quest for a sustainable economy is deeply compromised.

The above model can also be used to depict ENL's economic logic. See the figure below.

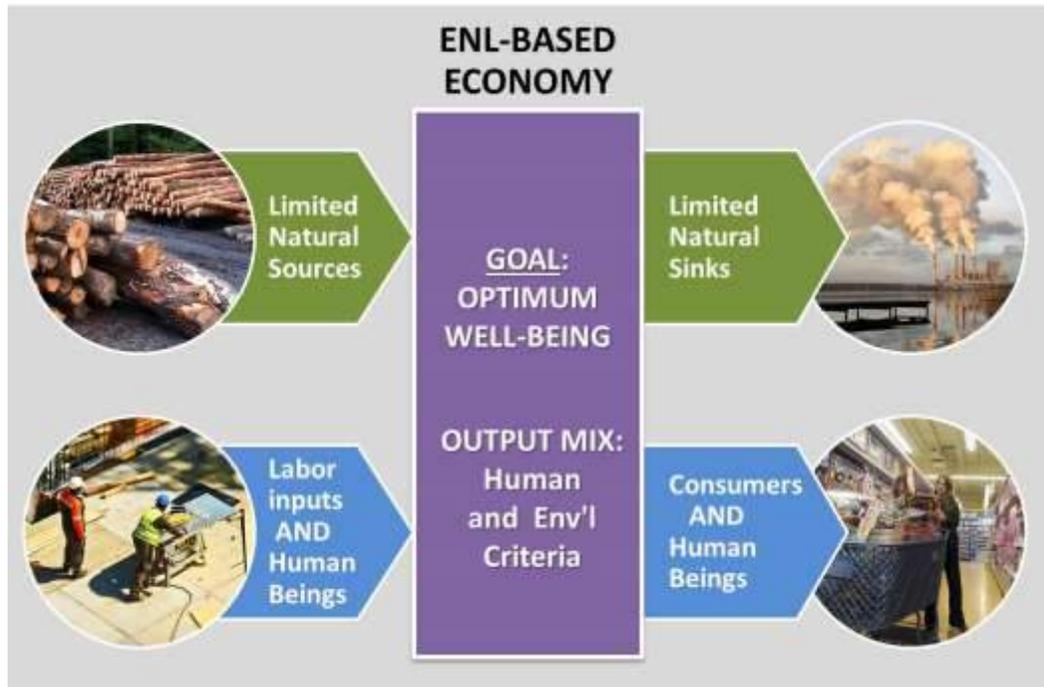


Figure 2 – ENL logic

Here the logic's goal is not maximum profits and growth, but sustainable well-being. "Well-being" in ENL logic is a combination of an objective and a subjective factor. The objective factor is physical health, which can be empirically assessed. The subjective factor is life enjoyment, which is internal to the individual. The goal of ENL logic is therefore to maximize humankind's physical health and life enjoyment under the constraints of limited natural sources and limited natural sinks.

Turning to the social factors, ENL logic treats workers as both labor inputs and human beings. As labor inputs they are commodities in a labor market, as under capitalism. As human beings their well-being must be maximized. Thus, when a new machine is being considered to increase labor productivity, an ENL analyst would examine not just the increased output rate, but also the effects of the modified labor process on the affected workers. If the overall results are negative, the machine would be economically irrational and would therefore be rejected.

ENL logic treats the populace in similar fashion: they are both consumers and human beings. As consumers they are markets for the economy's outputs, as under capitalism. As human beings their well-being must again be maximized. This means that allocation decisions, production processes, output distributions, etc. must take into account both the health effects of consumption and its impacts on life enjoyment.

Having clarified both capitalist and ENL logic, I would like to make two further points.

The first pertains to the word "industrial". Much concern has been expressed about today's industrial modes of resource-related production: industrial agriculture, industrial forestry, etc. However, this word simply refers to a set of technologies and methods. These could be applied sustainably for human benefit, or unsustainably for maximum growth and profits. For example, industrial agriculture has become highly destructive under capitalist logic because of its extensive use of mechanization, monocultures, and pesticides. Under ENL logic these factors would be strictly limited or entirely avoided based on environmental and human considerations.

The more accurate terms for these production activities are therefore "capitalist agriculture", "capitalist forestry", etc. If the conventional terms are used - as is done in this document because of their familiarity - we must remember that behind the neutral word "industrial" lurk the perils of capitalism's economic logic.

My second point is a sad but inescapable truth: capitalist logic is consistent with humankind's biological nature, but ENL logic is not. As biological creatures we seek to swell our numbers, increase our consumption, and expand our territory - precisely what capitalist logic supports. ENL logic, by contrast, compels us to severely restrain all these impulses. Its implementation in a post-capitalist economy will therefore make unprecedented ethical and lifestyle demands of our species. Humankind's ecological survival largely depends on our capacity and willingness to meet these non-biological imperatives.
