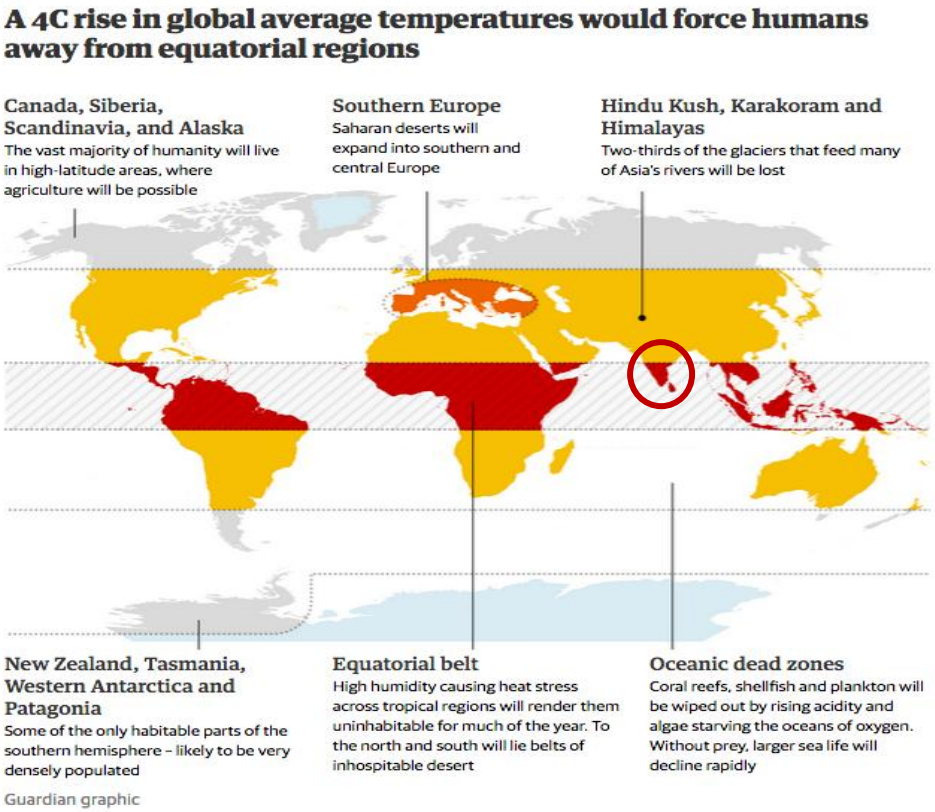
The Unconscionable Risks of the Net-Zero-by-2050 Objective

(Briefing for The Club of Rome – Indian National Association)



Source ~ The Guardian

The graphic portrays some of the consequences of a 4°C world (note especially the projected impacts on India):

- The impacts indicated in the source article are based on the assumption that 4°C will be reached in **2100,** but the plausible worst-case projection is for single years, or more, of such warmth occurring by the early **2060s** (Note that a 2°C increase, considered potentially catastrophic, will more than likely have been permanently breached prior to this date).
- Hans Schellnhuber, Johan Rockström and others, project that such warmth could reduce the ultimate carrying capacity of the planet to 1 billion or less in the absence of unimagined technological advances.
- Without question, considerable population displacement, starvation and resource conflicts would result.
- In the face of the inevitable population contraction, the inter-dependent global economic system that the global community depends on would likely unravel, with much of the damage occurring well before formally breaching 4°C.
- **Net-zero-by-2050, which is projected to lead to global warming of over 3°C, is an objective that is far too little, far too late**, especially because its formal definition does not account for induced carbon-cycle amplification of the warming (e.g., emissions resulting from permafrost thawing and forest degradation).
- For society, the upshot over coming decades will place all assets, lifestyles, and personal and familial well-being at ever-increasing and untenable levels of risk; indeed, there are major identifiable risks on the immediate horizon.

A critical consideration in evaluating the intensifying threats of, and essential responses to, climate change, is the frameworks used to assess risk and make decisions. Due to scientific protocols and administrative procedures, the risk-assessment process used by the IPCC, presently the primary basis for national and international decision-making regarding the appropriate policy responses to climate change, lags the cutting edge of observations and is consensus-based, generally being restricted to focusing on the central portions of the normal distributions of both observational trends and model simulations; low-probability, but high-consequence events, commonly referred to as 'fat-

tail' events and impacts, are generally not considered. For example, the measure of change in the global average temperature being used by the IPCC represents, in effect, the few-decade running average of this change, so that, even if sufficient mitigation were carried out to limit IPCC's global warming metric to the Paris goal of 2°C, half of the individual years would be at or above this level of harmful, even dangerous, warming. Given that most ecological and societal impacts are dependent on the high-end extremes of conditions, rather than the multi-decadal running average of the perturbation, basing risk assessments on the IPCC's projections in changes in global average temperature will lead to significantly under-estimating the likely damage and disruption.

It is for this reason that many sectors of society, including governments when evaluating existential threats, seek to identify and prepare plans to counter the risks associated with plausible worst-case scenarios, or 'fat-tail' events. And in dealing with a time-dependent positive forcing, it is essential to consider the latest available data, or intelligence, in order to minimize risk exposure. With regard to the increase in global average temperature, while the multi-decadal averaging indicates the warming to date is only about 1.1°C, two of the most recent years have been warmer than the preindustrial average by about 1.3°C. While this may seem a small difference, many important impacts such as coral bleaching, water resources, wildfire likelihood, crop yields, and more are dependent on the conditions of a particular year rather than the running multi-decadal average.

In preparing this document, our intention is to present the available evidence in the manner a dispassionate "due-diligence" team would use in presenting their findings to seasoned investors contemplating making a substantial investment aimed at building their long-term wealth and well-being. In seeking to fulfill this role, we identify, and to some extent quantify, the risks that merit being thoroughly evaluated by all in their applicable risk-assessment and decision-making frameworks so that they can fully define the problems they face from climate change and take the most effective actions that they can to improve their risk-exposure in terms of forward desired outcomes.

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Summary:

- The Net-Zero-by-2050, as presently specified, will not achieve the desired objective of limiting the increase in global average temperature to the values called for in the Paris Accord due to several omissions. These include the set of climate-affecting substances being considered (e.g., the effects of sulfate and black carbon aerosols are not included) and the use of the 100-year Global Warming Potential approximation to calculate required emissions cutbacks.
- Based on current trends in emissions and mitigation, it is likely that the increase in global average temperature for a month and quite possibly a year will first breach 1.5°C prior to 2030 and 2°C prior to mid-century, even though the multi-year averages that are reported may take a decade or so longer to be evident. And without very substantial reductions in global emissions, the warming for an individual month or year may exceed 4°C by the early 2060s, especially because of positive carbon-cycle feedback loops (e.g., from emissions due to thawing permafrost) that are starting to appear.
- A comprehensive presentation of the associated effects on climate, ecological and societal impacts that are likely occur at a 4°C increase in global average temperature, written by David Spratt, can be viewed here. Among other findings, a 4°C world would seem likely to be characterized by, as an alternative to moving into air-conditioned space (arguably impractical): a major disruption to, and likely contraction of, the world's peoples; widespread migration of those remaining to middle to high latitudes due to intolerance to the rising heat index; regional mass starvation and increasing conflicts due to the increasing likelihood of persistent shortfalls in food and water resources etc.
- It seems unlikely that anything close to global security and the interconnected global economy as we know it could persist, possibly beginning its decline decades prior to reaching the 4°C increase in the multi-decadal average of the increase in global average temperature used as the metric in international negotiations. Such an occurrence would place all assets, lifestyles and families at ever-increasing untenable levels of risk.
- Emissions reductions, although absolutely essential, are highly unlikely to achieve the stated objectives when one considers alone the magnitude of the task, inherent limitations of manufacturing capacity, and the reticence and inertia created by existing investments and their leadership; there are additional issues.
- A situation analysis carried out as a component of a dispassionate due-diligence risk-assessment framework of the nature predominately applied by business, makes clear that emissions reductions must be augmented with climate repair (e.g., CO_2 draw-down, for instance via the use of ocean nutrient flakes) and selective intervention (e.g., via injecting reflective aerosols into the stratosphere).
- Presently, there is no Plan 'B' (i.e., contingency plan) to supersede the emerging inadequacy of Plan 'A', the Paris Accord, which is inarguably failing to halt further changes in the climate. With the pace of global warming possibly accelerating, it is highly questionable whether sufficient emissions reductions can be implemented to meet the temperature objectives of the Paris Accord, and even if sufficient emissions reductions are made, if this will avoid the "dangerous anthropogenic interference with the climate system" as called for in the UN Framework Convention on Climate Change.
- While there is much discussion among policymakers and the public regarding the potential of a 3°C increase by 2100, it is essential to understand that this is a central IPCC estimate, and a good bit less than the plausible worst-case generally identified in due-diligence analyses. The business/investment/banking communities (BIBCs), the military, medical professionals, and responsible parents, all are expected to conduct contingency-based risk assessments prior to making important decisions, and in doing so to use plausible worst-case scenarios to ensure that they can identify and then reduce critical vulnerabilities through both prevention and preparation. At present, this is far from the approach that is being used by 'official' bodies such as the Conference of Parties to the UNFCCC. Given that we all live on our singular Spaceship Earth with no exit possibility, the world's present approach seems to have a high probability of failure, which is simply not an acceptable option.

The facts about "Net-Zero":

There are several assumptions hidden in the calculation of "net-zero" that merit exposure and consideration in evaluating the effect that achieving net-zero will have on the climate. For example, many of the calculations of net-zero presume that, as is the case at present, roughly half of anthropogenic emissions will continue to be absorbed by natural sinks (i.e., the terrestrial biosphere and the world's oceans), leaving only about half in the atmosphere to contribute to further warming. However, the global warming being induced by earlier emissions of greenhouse gases is leading to a reduction in the natural sinks uptake capacity; the result is that "net-zero" becomes time-dependent. As another problematic consideration, "net-zero" as defined by the IPCC only includes the warming influences of the Kyoto basket of gases (i.e., direct emissions of the primary gases); societal emissions of the substances that create tropospheric ozone and the changes in natural emissions caused by human-induced warming (e.g., emissions resulting from thawing permafrost) are not included in the definition. As a result, it is not at all clear that the world getting to net-zero emissions will halt global warming. We list below various of the factors that we think a formal due-diligence analysis must consider for confidence to be placed in an effective plan for moving forward:

- Account for the increasing CO_2 emissions from the Arctic resulting from it flipping from a sink of emissions to a source. In 2019, the Arctic is estimated to have contributed roughly the equivalent of 6.3% of that year's anthropogenic CO_2 emissions, plus unspecified quantities of methane, which, on a mass basis, is 100+ times as powerful a warming influence as CO_2 over 20 years, and nitrous oxide, which on a mass basis is roughly 300 times more powerful a warming agent as CO_2 on a 20-year basis (which has recently been estimated as 12 times more being released than previously thought);
- Compensate for the continuous contraction of the tree sink worldwide, now including the apparent flip of the Amazon region from a sink to a source of CO_2;
- Compensate for the worldwide emissions from rotting tree debris, which is being added to as a result of vast forest areas not continuing to be vibrant as the world warms. In terms of scale, the authors of the Amazon reference above noted: *Over the same 10-year period, degradation caused by fragmentation, selective cutting, or fires that damage but do not destroy trees, caused three times more emissions than outright destruction of forests.*;
- Compensate for any changes in ocean outgassing of CO_2 resulting from changes in ocean circulation and warming as a new balance is achieved between the atmosphere and ocean surface;
- Compensate for any changes in climate sensitivity and the ultimate temperature that is reached as the climate warms and eventually reaches a new equilibrium. Note that it is estimated that if all emissions ceased tomorrow, the mean temperature of the planet would continue to increase and ultimately exceed 2°C as the sulfate cooling influence is reduced;
- Compensate for the release of CO_2 sequestered in soil as temperatures continue to increase. Note in the referenced article: *… in a warmer climate, soils will be a less efficient carbon sink: storing less CO_2 and even releasing some of the previously stored carbon. In this case, at 2 degrees of temperature increase, these additional emissions could represent the equivalent of more than 5 years of global CO_2 emissions. Or twice as much CO_2 as the United States has emitted for nearly 100 years.*
- Ensure consideration of China's, India's, Mexico's and Australia's plans to continue the use of coal;
- Compensate for the progressive reduction of the SO_2 shield. Note that the value of the SO_2 shield, or how much it is inhibiting temperature increase, was formerly assessed as 0.5 to 1.1°C. Recent research, however, suggests that the cooling influence could be double that amount.

An indication of the complexity of the factors involved in making a net-zero calculation is provided in the UNEP 2020 Emissions Gap Report. The calculation that was done anticipated that anthropogenic emissions would decrease by 7% in 2020 as a consequence of COVID-19 pandemic and the resulting economic contraction (the peak month was estimated to have a 17% drop). Irrespective of the drop in emissions, however, from December 2019 to December 2020, the atmospheric CO_2 concentration increased by 2.91 ppm, which is an annual record!

A consequence of the many complexities is that all the 'officially' specified requirements pertaining to calculating net-zero as currently considered could be fulfilled and actual net-zero would not be achieved. What will really be required is going to zero fossil-fuel emissions as rapidly as possible, and at the same time building up the capacity to pull emitted CO_2 back out of the atmosphere (sometimes

called “climate repair”) to buy back lost time and deal effectively with the warming influence that will be exerted as a result of the loss of the SO_2 shield as the use of coal is phased out.

In light of these factors, there is no so-called allowable carbon-budget (i.e., an amount of future CO_2 emissions that can be accommodated without exceeding the Paris Accord’s temperature objectives). Given all the various considerations, it is a complete illusion to think that further emissions will not have serious impacts, resulting from both scientific reticence, in considering risks, and certain interested parties wanting to justify a continuance of BAU.

2050?:

The goal of attaining so-called net-zero by 2050 is to meet the goals of the Paris Accord, which were to (a) avoid breaching a 2°C increase and (b) pursue as an aspirational goal a pathway to avoid breaching 1.5°C, and then, presumably, staying as close to that increase as possible. While perhaps admirable in that there was world-wide agreement in their adoption, there are several problematic aspects.

First, global warming could well be entering a non-linear mode, a finding put forth several years ago by a team including members from Potsdam (PIK), which is one of the world’s most prestigious climate change research academies. Observations through 2020, as reported by James Hansen, also show that global warming appears to be accelerating , with last year’s warming calculated to be 1.3°C above preindustrial.

While applying a linear trend-line analysis covering the observations back to 1970 suggests the long-term average of the warming may not exceed 1.5 C until the mid-21st century, applying this approach to the most recent five years of data (which is not unreasonable given the suggestion that the temperature increase appears to be becoming non-linear) suggests the risk of a potential one-year breach of the 1.5°C threshold before 2030, and a risk of a potential breach of 2°C between 2035 and 2040. Note that in figure 1 a range was estimated by applying two trend-lines to allow for a range of natural variability.

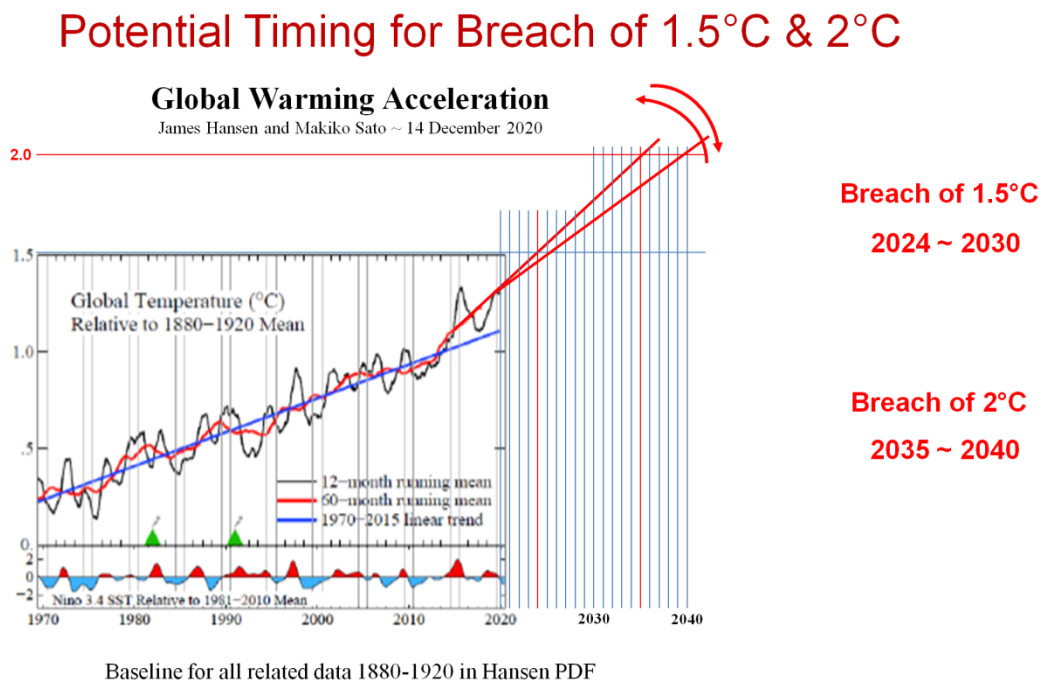

Figure 1 ~ James Hansen’s advisory re global warming acceleration (based on NASA/GISS data)

With global CO_2 emissions remaining persistently high, and the additional warming influence that will result from reduction of the sulfate shield as a result of the primary mitigation efforts being focused on reducing use of coal, near-term slowing of the pace of warming will be very difficult to achieve. Because of this, achieving net-zero emissions by 2050 will be far too late for limiting even decadal-average warming to the Paris Accord’s objectives, much less avoiding single year exceedances. To be effective, actions **to effectively counter the ongoing temperature increase must be thoroughly defined, planned, undertaken and accomplished well within the next decade.**

Plausible worst-case scenarios:

For a thorough due diligence analysis, the ability to withstand plausible worst-case scenarios needs to be considered; a classic one in the banking community being a run on the bank. One plausible worst-case scenario for a climate-change analysis is a projection derived from a highly credible study by the UKs Met Office Hadley Center, published in 2009, involving a potential breach of 4°C by 2055. Note within the text of the referenced article: *The Met Office ran 17 different variants of their model assuming slightly different strengths of important, but not definitively determined, feedbacks. In every case, the simulations suggested that a year or more with a 4°C warming was likely to occur by **2055** if emissions continue to rise at their current pace. Even if emissions reductions were imposed, it was still likely that a year or more could exceed a 4°C warming by **2070**.*

An additional plausible worst-case scenario, one that corroborates the above scenario, was published in 2011 in the UK's *Philosophical Transactions of the Royal Society*; an extremely credible source. At the end of the 'Introduction' of the referenced article, the authors noted: *Using these GCM projections along with simple climate-model projections, including uncertainties in carbon-cycle feedbacks, and also comparing against other model projections from the IPCC, our best estimate is that the A1FI emissions scenario would lead to a warming of 4°C relative to pre-industrial during the **2070s**. If carbon-cycle feedbacks are stronger, which appears less likely but still credible, then 4°C warming could be reached by the early **2060s** in projections that are consistent with the IPCC's 'likely range'.*

A1FI is the worst-case fossil fuel intensive scenario of the IPCC's 4th assessment. It is the only scenario that has accounted for carbon feedback emissions. As a result, the upper range of the A1FI scenario projects a 6.4°C warming by 2100, much higher than the mean estimate of 4.5°C. When including climate uncertainty, the IPCC's 5th assessment put the upper limit at 7.8°C by 2100 (IPCC 2014 AR5 WG3 SPM page 8 and Table SPM.1). In addition, the 2009 paper "Greenhouse gas targets for limiting global warming" by Malte Meinshausen et al., projected a 5°C mean for the A1F1 scenario and over 7.5°C as the two-sigma upper limit from their ensemble of model simulations.

Given these upper bounds for 2100, using a worst plausible outcome for a single year of 2°C by 2035 and 4°C by early 2060s appears reasonable to consider. What is particularly disturbing is that the present push to reduce emissions and adapt provides no assurance of being adequate to avoid severe environmental and societal impacts, and **there is no Plan 'B'** as a back-up set of measures to avoid a 4°C temperature increase, which has been said to be catastrophic for civilization. The executives of any corporation in such circumstances would have already prepared a list of additional measures to be taken (quite possibly, corporate executives might even have thought about an additional Plan 'C'). And facing such a threat, military leaders would already have prepared a contingency plan that they would be constantly reviewing and adapting based on the latest intelligence. Given the severe risks being faced, that the international community is not yet developing and testing additional mitigation and intervention efforts seems a failure to forthrightly face the consequences for having taken so long to get seriously started on mitigation.

Risks on the horizon:

1. A semi- or persistent world food crisis:

- As the mean temperature of the planet is increasing, adverse changes in the planet's ecosystem are progressively occurring that impact food production. Such changes concern the jet stream, ocean currents, and wind patterns, all of which since the onset of the industrial revolution have provided the reasonably stable weather patterns that are essential for mass agriculture; considerable evidence reveals the ongoing and ever-increasing adverse changes.
- Since the dawn of the 21st century, there have been multiple food crises. While IPCC's early assessments projected an enhancement of yield in key commodity-growing regions due to longer growing seasons and the fertilizing effects of elevated atmospheric CO_2 levels, suggesting that world food supplies would be adequate for at least the early decades of the 21st century: What is being seen is an increasing likelihood of shortages of key commodity crops. A partial list of such shortages includes: in 2008, widespread food riots; in 2010 Russia, due to crop failures in Siberia and the Ukraine in tandem with crop failures in other major grain producing regions, placed a moratorium on wheat exports to suppress internal price increases and potential unrest (note that this served to increase global commodity prices and Russia, for the identical reasoning, placed a short-term ban on exports in 2020). in 2010, Arab Spring being triggered in part when regional food prices increased; in 2011, sustained drought leading to over 1 million hungry people emerging from the countryside in Syria and, at least in part, triggering the still on-going conflict; in 2012, a major drought in the

US resulting in culling back cattle herds to 1956 levels; in 2015, the UN predicting that by 2020 50 million people would ultimately be displaced from their homes in sub-Saharan Africa due to desertification and associated crop failure; in 2019, ominous signs of yet another world food crisis on the horizon; and in 2021, the UNFAO Food Price Index heading towards, if not on the verge of reaching, a crisis level.

- Cumulatively, the world has already experienced the typical impacts of what might be expected in year 1 of a worldwide food crisis. As climate change proceeds and the frequency of regional extremes increases, and crop failures become more likely in key growing regions, food price and refugee impacts can be expected to become more intense and more widespread in food-importing nations as reserves are exhausted and food-growing nations cut their exports to limit price increases. If the situation continues to intensify, which is expected as what is really being experienced are shifts in storm tracks that is foretelling long-term aridification rather than termination of a random drought, changes in currency exchange and interest rates are likely to be more and more severely disrupted, quite likely triggering a significant share of the international derivatives market (possibly up to 80%). **The potential consequence would be to implode the financial system** and render the global economic system that is so essential to sustaining global well being literally facing its the gravest problem ever.
- The bottom-line is that a semi- or persistent world food crisis could be triggered in the near-term if there are coincident failures in just two or more of the very limited set of regions that provide large fractions of the exports of key food commodities to the world market. If climate change is not rapidly controlled and global average temperature increases continue to hear toward 3 to 4°C, there is a clearly identifiable risk that a persistent world food crisis could become the root cause of mass starvation that is so severe it might lead to a collapse of the generally peaceful civilization that we now enjoy.

2. Uncontrollable climate change:

- The IPCC assessment process has been established in order to provide the most authoritative consolidation of scientific research and economic commentary. The very nature of the process, however, leads to its findings being well back from the cutting edge of scientific findings and economic projections that represent the worst plausible outcomes appropriate for considering in traditional risk assessments. Among the factors contributing to this are the time it takes for scientific research to be conducted and confirmed (which is inherently difficult given the unprecedented climatic and cryospheric transition that is underway and is often 15 to 30 years in duration), the several year cycle time of the IPCC assessment process, and the smoothing of findings that occurs in IPCC's pursuit of unanimous agreement in its findings by member nations, a number of which have strong investments in the ongoing use of fossil fuels. Earth system history provides alarming indications of how drastic changes could be, and there are early signs that uncontrollable long-term transformation, if not already started, could be triggered at any time over the next few decades (e.g., in the accelerating loss of mass from the Greenland and Antarctic ice sheets; in the release of climate-warming gases from thawing permafrost; in the increasing dislocations and loss of species). To the extent that traditional scientific protocols and IPCC administrative procedures are followed, it is likely that 'official' confirmation that mitigation of emissions and related actions cannot halt significant further climate change will not come until decades after this critical point has been reached, so **far too late** to ensure the recovery the climatic conditions that have been so beneficial for society during the Holocene (i.e., the last 8 thousand years or so)
- As described above, the Arctic has flipped from being a sink to a source of formerly sequestered GHGs, primarily CO_2. This region of the planet contains so much sequestered GHG (as shown in figure 2), however, that there is a risk that ongoing warming could lead to sufficient release of CO_2 and or CH_4 that the resulting temperature increase could trigger uncontrollable climate change, meaning that even climate intervention proposals may be unable to bring the global average temperature back to near present levels. While the exact level of global warming that would lead to uncontrollable warming is not known, there are indications that as small a warming as 1.5°C to 2°C may trigger such a transformation (e.g., see Anton Vaks et al.).
- As shown on the image at the right of figure 2, the quantity of GHGs sequestered in onshore and offshore Arctic permafrost is estimated to be several times the current atmospheric loading.

- The last few years have experienced record temperatures over regions where permafrost resides and scientists have been shocked that the warm weather conducive to permafrost thawing is occurring roughly 70 years ahead of model projections.

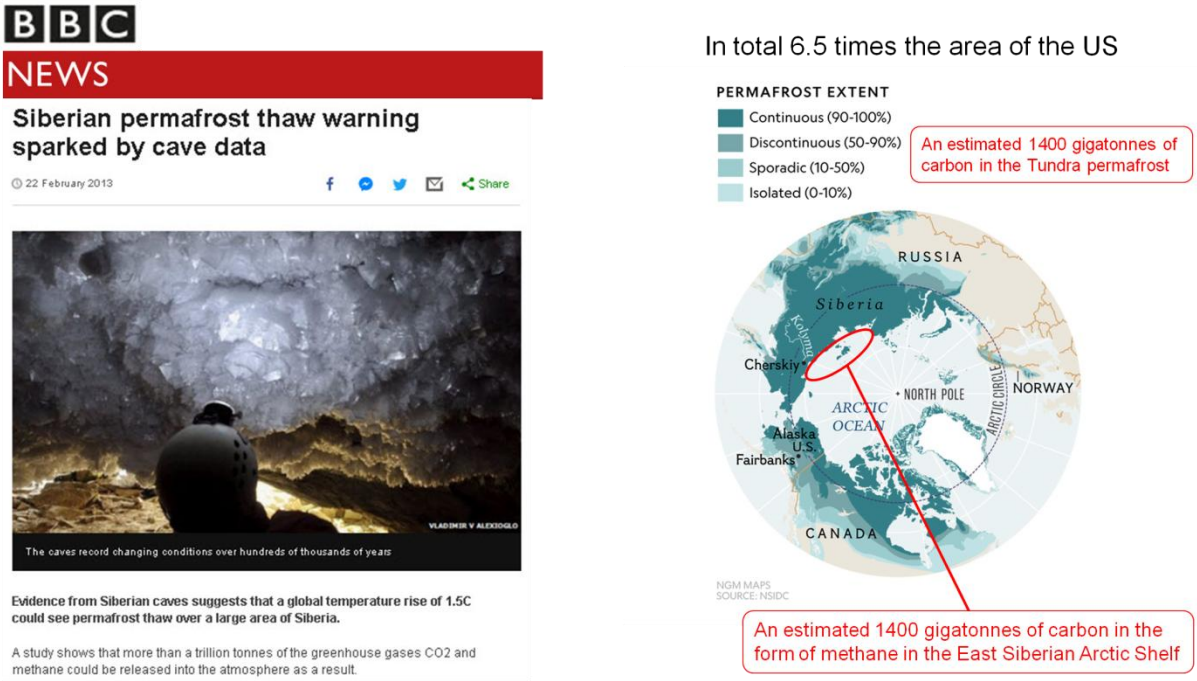

Figure 2 ~ The Siberian cave Anton Vaks et al. discovered, plus the quantities of onshore and offshore GHGs sequestered in Arctic permafrost

The bottom-line is that as the mean temperature of the planet increases, the Arctic is experiencing an increase in annual average temperature that is roughly three times the global mean as a result of various amplifying factors. If uncontrollable climate change is triggered, it might well be starting in the Arctic. Disturbingly, the international community has neither developed nor tested an alternative response strategy. With no plans to counter the potential for uncontrolled warming, the world is thus totally exposed to the consequences of this risk.

Building toward a Plan 'B':

- As a general guideline, the fundamental step required is to derive all needed energy services from sources that do not emit CO_2 or other greenhouse gases, doing so in the most efficient way possible. Electricity generated by wind turbines and solar cells is a leading example of a CO2-free source and LED lightbulbs of an efficient way of providing light. There are, however, many other approaches, some available now, some that may take decades to become useful contributors to the global mix of sources, and some still to be conceived.
- A productive starting point for corporations wanting to take more effective actions would be to contact Paul Polman's organization. Polman is the retired CEO of Unilever, a company he progressively and profitably structured to be carbon neutral, and is now dedicated to dispersing that knowledge to as many corporations as possible. Corporate action is essential to creating a more effective approach to moderating climate change and minimizing risk. An additional option is to contact Development Alternatives Group.
- The comprehensive approach that is needed is to decrease from roughly 80% to near-zero the use of fossil fuels to provide energy services. Accomplishing this will require many actions, some individual and some collective, each tuned to a particular situation or sector; there will inevitably be both some overlap and some gaps. At a minimum: tens of millions of buildings must be weatherized; current electric power generation must be converted to non-CO_2 emitting technologies; over 1 billion cars (plus many trucks, buses, and other vehicles) must be replaced or retrofitted; roughly 53,000 large sea going vessels (plus small craft) must be repowered (though the many vessels involved in transporting petroleum and coal will no longer be needed); and the transportation services of 23,600 commercial aircraft (today's

number, a number forecast to double in the next 20 years) and an unknown number of smaller and military aircraft must be converted. The task is enormous.

- Minimizing what in the past has been a level of totally unacceptable, even existential, risks that would have the potential to devolve organized society and the productivity and diversity of the environment if left unattended even have the potential of species extinction, it is essential that:
  - The current assessment framework, which has been focused on dealing with central tendencies identified in scientific assessments, be replaced by the comprehensive risk-assessment, due-diligence framework, which has long been the approach successfully used by the investment, business, national security, and infrastructure planning communities to ensure the relatively stable conditions that have been conducive to peace and overall economic development;
  - The prevailing short-term planning time horizon be lengthened to one more appropriate to addressing the long-term sustainability and environmental problems being faced by society;
  - The actual problem that society faces be better defined, including by increasing the focus on increasing resilience to plausible near- and longer-term extremes and worst-case situations, such events being the ones that lead to the greatest societal and environmental impacts;
  - Recognition not only of the high risk that society will face as the global temperature objectives of the Paris Accord (i.e., 1.5 to 2°C) are exceeded, but also the very significant and unacceptable risk that will exist if the global average temperature, and so consequent sea level rise, is not rapidly brought back to a level near its mid-20th century value; and
  - Those with sufficient influence in the 'market' act collectively in short order to accelerate the effort to limit climate change and return to typical 20th century conditions, doing so, if necessary, by applying political pressure. The reality is that in this circumstance, a problem of a magnitude not previously successfully addressed by modern civilization, individual exposure to risk can only be minimized or eliminated though concerted collective actions.

Conclusions:

- The basic premise of the current economic model is unlimited growth that depends upon unlimited resources and a limitless environment. The planet, however, has limited resources and boundaries, or critical thresholds, that we are now approaching that if passed will lead to potentially irreversible tipping points that in turn will lead directly to disastrous, even catastrophic, outcomes. A *pro forma* balance sheet for the entire planet makes clear that the world community is consuming replenishable assets at 1.7 times their recovery rate and liquidating essential fixed assets to generate near-term profit (e.g., forests and corals are being lost because the atmosphere is being used as if dumping CO_2 into it will have no impact). Unfunded liabilities for repairing the climate now total $100 to $200 trillion, and ongoing emissions of CO_2 from combustion of fossil fuels are adding to these unfunded liabilities at a rate of $2 to $4 trillion per annum.
- Were the planet a business, say *Earth Inc.*, the Board of Directors would undoubtedly declare the equivalent of Chapter 11 bankruptcy as considerable reorganization is essential to ensuring its successful operation will continue (and neither liquidation nor failure are options). As matters stand, were the Board to attempt to issue bonds to fund reorganization, and the identifiable risks pertaining to those bonds were correctly assessed by rating agencies, they would at best be considered to be at 'junk' status.
- The alternative to literally risking everything being put at risk by the slow pace of actions being taken under the UN Framework Convention on Climate Change (UNFCCC) is to create a new sustainable paradigm that will ensure forward prosperity for all stakeholders; particularly children. This is unquestionably the greatest, and most necessary, economic opportunity of all time, and yet it languishes on the sidelines as the risks associated with the current paradigm are frequently unacknowledged and thus continue to mount.
- The bottom-line is that as climate change continues, largely unabated, the window of opportunity to remediate it is rapidly closing and options for doing so are rapidly diminishing. It is not a question of listening to the science, as some assert; it is a question of evaluating observed trends and scientific analyses within an appropriate risk-assessment framework that will ensure the optimum outcome for society. Our slogan must be "Pay attention to the risk."

Footnote:

This document was prepared by a multi-disciplinary team, with extensive ever-increasing international networks, in order to raise awareness that the decision-assessment framework being used to generate 'official' response plans to climate change under the UNFCCC is considerably different than the risk-assessment frameworks that are being used in many sectors of society and have been an essential underpinning for successful economic development. The discussion presented here represents a mere fraction of the subject-matter knowledge that we have assembled over years of working together and with others. Members of the team have devoted thousands of hours to the subject of climate change, several their entire careers. All of us see the current approach to dealing with climate change to be inadequate, held back by focusing too much on waiting until there is high confidence in findings as risks are not only worsening, but being realized at a pace exceeding the pace of scientific understanding. With only one spaceship Earth available to us, risks must be addressed aggressively if society as we know it is to survive.

We stand by to help in any way possible, and invite others to bring their contributions to understanding and addressing our increasingly dire situation.