PAMIR Law Group

The Climate Catastrophe: Hard Realities of a Potentially Life Ending Occurrence ("LEO") Solution

Are Humans Already "Game Over?" Are Humans Too Stupid to Survive?

Can Humans Adapt and Change Behavior to Survive? What Must Humans Do to Prevent Going Silently Into the Night?

Achieving "R/R": Accumulated GHG/Heat Must be Removed and New GHG/Heat Must be Reduced ("R/R")

Are You Part of the Problem or Are You Part of the Solution?

By Nicholas V. Chen*

***Special thanks to Jose Ponce, Shelley Cheng**

Executive Summary

- **R/R of GHG/heat and cooling will require the combined effort of governments, industry, universities, experts, new technologies, financial industry, professors, NGOs and nations to use their prowess, political will, industrial, scientific and financial resources to implement scalable, commercial and industrial solutions to save humanity/life on earth and the world.**
- **In order for Humanity to be safe it must successfully go from W to X to Y and then to Z:**

- **"W" Achieve Energy Transition** : requires replacing all fossil fuel energy sources with zero-carbon sources **(~5,172GW)**

- **"X" Achieve Decarbonization and Net-Zero**: requires using zero-carbon energy instead of fossil fuels to power industry, transport, building and agriculture sectors **(~11,500GW)**

- **"Y" Cap, peak and turndown of GHG/Heat**: GHG/Heat is increasing at a rate of 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute due to (i) carbon looping, (ii) tipping points, (iii) carbon bombs, and (iv) War. R/R of GHG/Heat will not happen automatically, it requires mass human intervention

- **"Z" Safe Harbor:** To survive, humanity must act immediately, at a global scale to deploy massive amounts of zero-carbon energy to power the (existing/new) technologies necessary to R/R GHG/heat in the atmosphere to cool the planet to reach Safe Harbor. According to multiple studies, 500 million tons of CO_2 must be removed from the atmosphere to reach Safe Harbor (350PPM). This will require **~171,233GW** with existing technologies. We will need climate scientists and experts to calculate this.

Executive Summary

- **At the current (2023) rate of zero-carbon energy production 3,720GW (1.4% growth per year), Humanity:**
  - Achieves Energy Transition (W) in 63 years (2086)
  - Achieves Decarbonization/Net-Zero (X) in 102 years (2125)
  - Achieves Y and Z in 277 years (2300)
- **Humanity is experiencing mass die-offs in 26 years (2050) if it continues business as usual**
- **Humanity is catastrophically behind in deploying zero-carbon energy in order to reach safe harbor. To illustrate:**
  - To achieve Energy Transition in 1 year humanity must increase zero-carbon energy production by **100x**
  - To achieve Decarbonization/Net-Zero in 1 year, Humanity must increase zero-carbon energy production by **220x**
  - To reach Y and Z in 1 year, Humanity must increase zero-carbon energy production by **3200x**
- **To save humanity, the production rate of zero-carbon energy must be massively accelerated**
- **Societies/leaders must cause Governments and the finance industry (banks, investors, insurers) to allocate all subsidies and financing towards the development and deployment of zero-carbon energy instead of fossil fuels**
- **Using 1GW Small Modular Reactors ("SMRs") to illustrate the zero-carbon electricity needed to save Humanity***
  - Energy Transition: 5,172 x 1GW zero-carbon energy (SMRs)
  - Decarbonization/Net-Zero: 11,500 x 1GW zero-carbon energy (SMRs)
  - Reach Y and Z: 171,233 x 1GW zero-carbon energy (SMRs)

*Assuming no growth in energy demand from 2023 and assuming no further GHG/Heat accumulation (overshoot) after 2023

Solution for the Current Climate Catastrophe

Humanity is Smart Enough to R/R Accumulated and New GHG/Heat. This Means:
- Make the Parachutes
- Put it On
- Use it as Early As Possible

China's Leadership teams with world's finest talent to create solutions to defeat the Climate Catastrophe with:
- Dr. King's Team at the Cambridge Center for Climate Repair
- Rest of the World

Accelerate R/R with use of massive amounts of zero-carbon energy to go from "W" "X" to "Y" and then from "Y" to "Z" ASAP

Implement massive geoengineering solutions using existing and new technology to R/R GHG/heat and reduce impact of climate overshoot to slow down the acceleration and reach soft landing at Safe Harbor

Implement Immediately the "4Rs" Globally
1. Reduce Emissions
2. Remove Excess Emissions
3. Repair Ecosystems
4. Strengthen Resilience Against Climate Impacts

As GHG/Heat Increases Freefall Velocity Increases

To Achieve R/R of GHG/Heat Humanity Needs Massive Amounts of Zero-Carbon Energy

This Will Require a Collective Effort from Governments, Industry, Universities, Experts, New Technologies, Financial Industry, Professors, NGOs and Nations

Humanity Reaches Soft Landing/Safe Harbor

W: Energy Transition Replace Fossil Fuels with Zero-Carbon Energy

~5,172GW

X: Decarbonization and Net-Zero

~11,500GW

Carbon Looping, Tipping Points

Carbon Bombs, War

(~171,233GW) or more

11 Hiroshima bombs/second or 660 Hiroshima bombs/minute)

Y: Rising GHG/Heat Peak/Cap Before Downturn Begins "Terminal Velocity"

Additional Amounts of Zero-Carbon Energy to R/R GHG/Heat from Overshoot

Z: Safe Harbor for Humanity: 350 PPM

"4R"* (Geoengineering Planetary) Solutions

1. Reduce Emissions, 2. Remove Excess GHG Emissions, 3. Repair Ecosystems, and 4. Strengthen Global and Local Resilience Against Inevitable Climate Impacts.

All scientists agree: the climate catastrophe, which is underway, will end the world as we know it, in no later than 25 years (2050)

Humanity has 3-5 years to plan and schedule deliverables on each of the 4Rs.
Enough zero-carbon energy must be produced to run the existing/new technologies and these must be developed, financed, licensed, and managed to be deployed globally to R/R

Reduction and Removal ("R/R") of GHG/heat and cooling is the only thing that matters for humanity's survival.
In order to achieve the 4Rs humanity must combine all efforts of the world's finest minds, governments, industry, universities, experts, new technologies, financial industry, professors, NGOs and nations to use their prowess, political will, industrial, scientific and financial resources to implement scalable, commercial and existing/new industrial solutions to save humanity/life on earth and the world.

The 4Rs is the only pathway to address the causes and effects of W, X, Y and Z by completing energy transition (W), achieving decarbonization/net-zero (X), peaking and begin downturn of excess GHG caused by carbon bombs, war, carbon looping and tipping points (Y) to finally reach safe harbor (Z).

To survive, humanity must act immediately, at a global scale to deploy massive amounts of zero-carbon energy to power the (existing/new) technologies necessary to R/R GHG/heat in the atmosphere to reach safe harbor.

***4R (Geoengineering, Planetary) Solutions Proposed by Dr. David King for Humanity to Reach Safe Harbor**

- Sir David King, Former UK Chief Scientist, Advisor to Prime Ministers Blair and Brown
- University of Cambridge Center for Climate Repair, Director

Dr. King's Proposed "4R" Geoengineering Planetary Solutions

1. Reduce Emissions

- Transition to zero-carbon energy
- Decarbonize industry
- Electrify transport, buildings and heating
- Reduce Agriculture emissions
- Implement energy saving technologies

2. Remove Excess GHG Emissions

- Afforestation and reforestation
- Marine cloud brightening
- Stratospheric aerosol injection
- Carbon capture and storage
- Direct air capture
- Bioenergy carbon capture and storage
- Soil carbon sequestration

3. Repair Ecosystems

- Covering the arctic sea with bright white cloud cover during north pole summer
- Pumping seawater on top of the thin layer of ice formed over the sea in the polar winter to thicken it
- Ocean surface iron fertilization, which stimulates the growth of phytoplankton
- Kelp farms to capture GHG
- Accelerated oxidation of methane
- Marine biomass regeneration

4. Strengthen Global and Local Resilience Against Inevitable Climate Impacts

- Community preparedness programs
- Infrastructure resilience programs
- Sustainable fisheries management programs
- Urban planning and green infrastructure

Other R/R and "4R" Solutions

(Examples, Not All Inclusive)

1. Reduce Emissions

Stop direct human emissions and limit GHG/Heat release and temperature rise.

2. Remove Excess GHG Emissions/Heat

Remove the accumulated concentration of GHG/Heat by using existing/new technologies that allow heat to escape and decreases global temperatures.

3. Repair Ecosystems

Restore ecosystems to enhance their ability to sequester carbon, support biodiversity and improve resilience against climate impacts.

4. Strengthen Global and Local Resilience Against Inevitable Climate Impacts

Prepare communities and ecosystems to withstand the unavoidable effects of climate change especially in the Global South and in regions experiencing the disproportionate negative effects of the climate catastrophe.

Humanity's Survival Prospects: Humanity Must Reach W, X, Y and Z to Reach Safe Harbor





Zero-Carbon Energy Rate of Production*	Years to Achieve Energy Transition (W) (Additional 5,172GW)	Years to Achieve Net-Zero/Decarbonization (X) (Additional 11,500GW)	Years to Achieve Y and Z (At Least 10x the Amount Need to Reach X+Y (171,233GW))
Many Experts Conclude: The Consequences of the Climate Catastrophe Have Started and Will Worsen Exponentially to Catastrophic Proportions in 26 Years by 2050.			
Extreme Weather (Ongoing)			
Wildlife Populations Reaching Point of No Return (Ongoing)	Climate Refugees and Displaced Populations (Ongoing)	Decline of Pollinators; Insects and Birds (2024-2030)	Conflicts Over Dwindling Resources (Water, Land, Food, Fuel) (2025-Onward)
Agriculture and Food Chain Collapse (2030-2040)	Massive Acceleration of Ecosystem Loss and Biodiversity Collapse (2040-2050)	Mass Human Deaths (2050+) (26 Years)	
Current (2023) Rate of Production (1.4% Growth Per Year)[1] **(Renewables 3,342GW + Nuclear 378GW = 3,720GW)[2]**	**63 (2086)**	**102 (2125)**	**275 (2299)**
During COP28, Countries Pledged to Triple Nuclear Energy by 2050[3] (Assume Renewables Maintain Current Rate)	**55 (2078)**	**91 (2114)**	**257 (2280)**
At the Current Rate of Zero-Carbon Energy Production Humanity is Over Even if Nuclear Energy is Tripled by 2050 Humanity is Over Mass Death of Humans Starting 2050			
2x Current Rate of Production (2.8% Growth Per Year)	**32 (2055)**	**51 (2074)**	**139 (2,162)**
8x Current Rate of Production (11.2% Growth Per Year)	**8 (2031)**	**13 (2036)**	**36 (2059)**
An 8x Increase in Zero-Carbon Energy Will Not Save Humanity Food Chains and Agriculture Collapses by 2040 No, Animals, No Trees			


*Assuming no growth in energy demand from 2023 and assuming no further GHG/Heat accumulation (overshoot) after 2023

1. Global Share of Low Carbon Energy: https://ourworldindata.org/electricity-mix
2. US Energy Information Administration Global Electricity Generation: https://shorturl.at/CJbFY
3. Countries Pledge to Triple Nuclear Energy by 2050: https://www.energy.gov/articles/cop28-countries-launch-declaration-triple-nuclear-energy-capacity-2050-recognizing-key

Humanity's Survival Prospects: Humanity Must Reach W, X, Y and Z to Reach Safe Harbor





Zero-Carbon Energy Rate of Production*	Years to Achieve Energy Transition (W) (Additional 5,172GW)	Years to Achieve Net-Zero/Decarbonization (X) (Additional 11,500GW)	Years to Achieve Y and Z (At Least 10x the Amount Need to Reach X+Y (171,233GW))
10x Current Rate of Production (14% Growth Per Year)	6 (2029)	10 (2033)	29 (2054)
Humanity is Still Not Safe. Humanity Must Reach Y and then go to Z to Survive. The More Time it Takes to reach W and X the More Zero-Carbon Energy will be Needed to Offset the Effects of Accumulated GHG/Heat Caused by Carbon Looping, Tipping Points, Carbon Bombs and War			
18x Current Rate of Production (25.2% Growth Per Year)	4 (2027)	6 (2029)	17 (2040)
Below This Line Humanity Survives (Theoretically with Assumptions) Humanity Must Increase Zero-Carbon Energy Production by 100x and Develop and Commercialize Technology to R/R GHG/Heat in Order to Survive			
100x Current Rate of Production (140% Growth Per Year) Complete Energy Transition in 1 Year	Zero-Carbon Energy Must be Deployed at 100x the Current Rate To Reach Energy Transition in 1 Year (2024) (5,172GW)	2 (2025)	6 (2029)
220x Current Rate of Production (309% Growth Per Year) Achieve Net-Zero/Decarbonization in 1 Year		Zero-Carbon Energy Must be Deployed at 220x the Current Rate To Achieve Net-Zero/Decarbonization in 1 Year (2024) (11,500GW)	3 (2027)
3270x Current Rate of Production (4590% Growth Per Year) Reach Safe Harbor in 1 Year			Zero-Carbon Energy Must be Deployed at 3200x the Current Rate To Reach Y and Z in 1 Year (2024) (171,233GW)

*Assuming no growth in energy demand from 2023 and assuming no further GHG/Heat accumulation (overshoot) after 2023

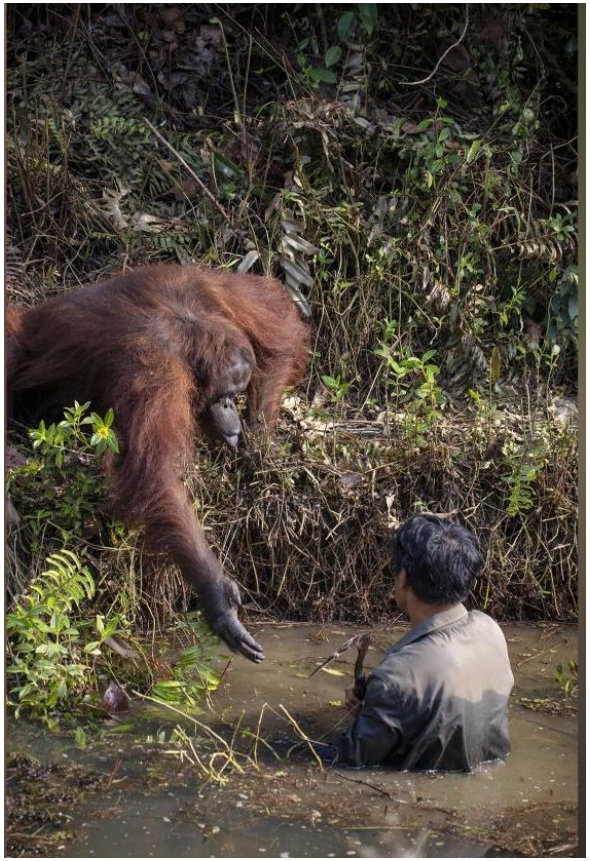
1. Global Share of Low Carbon Energy: https://ourworldindata.org/electricity-mix
2. US Energy Information Administration Global Electricity Generation: https://shorturl.at/CJbFY
3. Countries Pledge to Triple Nuclear Energy by 2050: https://www.energy.gov/articles/cop28-countries-launch-declaration-triple-nuclear-energy-capacity-2050-recognizing-key

Humanity's Survival Prospects: Humanity Must Reach W, X, Y and Z to Reach Safe Harbor

- **The Only Criteria that Matters for Humanity's Survival is the Removal and Reduction ("R/R") of GHG/Heat in the Atmosphere**
  - Reduction: Completely transition from fossil fuels to zero-carbon energy and use it to power industry, transport, building and agriculture sectors (W and X)
  - Removal: Use new technologies to reduce the accumulated GHG and heat in the atmosphere from carbon looping, tipping points, carbon bombs and war to allow the planet to cool (Y and Z)
- **The Production Rate of Zero-Carbon Energy Must be Massively Accelerated to Achieve R/R (See Slides 17-19)**
- **Achieving Removal and Reduction of GHG/Heat Must be Achieved Using the 4Rs**
  - Reduce Emissions
  - Remove Excess Emissions
  - Repair Ecosystems
  - Strengthen Resilience Against Climate Impacts
- **Using the 4Rs to Achieve R/R Of GHG/Heat and Cooling Will Require The Combined Effort Of Governments, Industry, Universities, Experts, New Technologies, Financial Industry, Professors, NGOs And Nations To Use Their Prowess, Political Will, Industrial, Scientific And Financial Resources To Implement Scalable, Commercial And Industrial Solutions To Save The World**
- **In Order to Save the Planet and All Living Beings, National Leaders Must Cause Governments, Regulators, Regulator's Implementers, Businesses (Enterprises, Supply Chains, Group Companies) and Deployers of Capital (Banks, Investors, Insurers) to Implement New Practical Systems, Standards and Tools Based on a New Value System To Change Behavior, Operations and Capital Deployment to Achieve R/R Of GHG/Heat by Using the 4Rs**

Conclusion

- **In order for Humanity to be safe it must successfully go from W to X to Y and then to Z**
- **To save humanity, the production rate of zero-carbon energy must be massively accelerated**
- **Humanity is catastrophically behind in deploying zero-carbon energy in order to reach safe harbor. To illustrate:**
  - To achieve Energy Transition in 1 year humanity must increase zero-carbon energy production by **100x**
  - To achieve Decarbonization/Net-Zero in 1 year, Humanity must increase zero-carbon energy production by **320x**
  - To reach Y and Z in 1 year, Humanity must increase zero-carbon energy production by **3270x**
- **Using 1GW Small Modular Reactors ("SMRs") to illustrate the zero-carbon electricity needed to save Humanity***
  - Energy Transition: 5,172 x 1GW zero-carbon energy (SMRs)
  - Decarbonization/Net-Zero: 11,500 x 1GW zero-carbon energy (SMRs)
  - Reach Y and Z: 171,233 x 1GW zero-carbon energy (SMRs) and additional zero-carbon energy



There is a Choice…

“Humanity has less than a five year window to take decisive action on climate change.”

- Sir David Anthony King, Former UK Chief Scientist

“Now is the time to mobilize, now is the time to act, now is the time to deliver. This is our moment of truth.”

- Antonio Guterres, UN Secretary-General

Source: Anil Prabhakar, The orangutan held out its hand to the man, who was clearing snakes from a river https://us.cnn.com/2020/02/07/asia/orangutan-borneo-intl-scli/index.html

For More Information

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Amount of Energy Required to Reach Safe Harbor

- **According to Dr. David King and MIT, humanity must remove 500 billion tons of CO2 from the atmosphere to reach Safe Harbor (350PPM)[1]**

Assumptions on Energy Requirement:

CO2 to be Removed	500 Million Tons
Energy Required to Remove 1 Ton of CO2[2]	3,000kwh

Calculations:

500 Million Tons x 3,000kwh = $1.5x10^{15}$ kwh

$1.5x10^{15}$ kwh ÷ 8760 (hours in a year)

= 171,233GW

1. MIT Climate Portal: How Much Carbon Dioxide Would We Have to Remove From the Air to Counteract Climate Change? https://climate.mit.edu/ask-mit/how-much-carbon-dioxide-would-we-have-remove-air-counteract-climate-change
2. Atmospheric Alchemy: The Energy And Cost Dynamics Of Direct Air Carbon Capture: https://link.springer.com/article/10.1557/s43581-024-00091-5