



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

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
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Preface

- **The fossil fuel industry with the support of Governments and the financial industry (banks, institutional investors, insurance companies) (“Cooperators”) are financing the Climate Catastrophe (the extermination of everyone and everything on the planet) by:**
 - ▶ Governments: Deploying massive fossil fuel subsidies (USD 13 million/minute, USD 7 trillion/yr)
 - ▶ Finance Industry: Financing (lending, investing, insuring) the use of fossil fuels and massive carbon emissions from fossil energy generation ([See W](#)) and emissions from industrial, buildings, transport, agriculture sectors and businesses and supply chains ([See X](#))
- **This financial support is a direct assault on the existence of humans and all living things on the planet (See: [The 2024 State of the Climate Report: Perilous Times on Planet Earth](#))**
- **The fossil fuel industry and their cooperators use an “illusion of solutions” (See Slide 13) to distract, delay and obstruct climate solutions.**
- **Humanity is not approaching a Climate Catastrophe. Humanity is in it. We, as a species, must act immediately and decisively to save all life on earth and future generations**
- **Everyone you know and your entire family, including your children, grandchildren, brothers and sisters and is facing climate death. Humanity will be extinct. Fact.**
- **The fossil fuel industry and their Cooperators are causing the death of all living things and future generations**
- **How has humanity allowed this madness to continue for the last 80 years? Are you going to do anything to change the end of humanity?**
- **Are you part of the problem or will you be part of the solution?**
- **Are you going to let the children and future generation down?**

Executive Summary

- Humanity believes it is safe from the Climate Catastrophe if it:
 - ▶ (1) completes Energy Transition (replacing fossil fuels with zero-carbon energy), and
 - ▶ (2) achieves Decarbonization/Net-Zero (using zero-carbon energy sources, not fossil fuels to power industry, transport, buildings and infrastructure).
- Fossil fuel companies and their Cooperators (Governments, Financiers, Industry, Media) have pushed this comforting but false narrative to humanity for decades. Thus, many mistakenly believe this the reality (See: illusion of Solutions slide 11).
- The Hard Reality: Humanity is wrong. Humanity is not safe from the Climate Catastrophe. Even after achieving (1) Energy Transition, and (2) Decarbonization/Net-Zero, the planet keeps warming due to accumulated GHG/Heat in the atmosphere. With GHG accumulating in the atmosphere, the Earth's ability to cool is reducing.
- The first law of thermodynamics states that energy cannot be created or destroyed, but can only be converted from one form to another. When the Earth absorbs energy from the sun or from humanity's global warming activities, it must either store this energy or release it back into space in the form of heat. GHG prevents heat from escaping to the atmosphere and therefore the planet continues to get hotter. There is no GHG/Heat loss nor any planetary cooling
- The second law of thermodynamics states that entropy, always increases over time. In the context of the Earth's climate system, this means that energy flows from hotter to cooler regions, excess heat negatively impacts earth's ecological systems (Oceans, Atmosphere, Forests, Glaciers, Etc.) and accelerates carbon looping and tipping points.
- No one is talking about how to cool the planet. No one is working to cool the planet.
- **Humanity's spotlight must be laser focused on deploying mass global solutions to Remove accumulated GHG/Heat and Reduce new GHG/Heat ("R/R"). This is the only criteria that matters for humanity's survival to cool the earth's temperature. Why is no one thinking of cooling?**
- The impact of GHG/Heat in the atmosphere is cumulative and has been increasing since the Industrial Revolution.
- From 2020-2023 the planet has been heating at a rate of 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute.
- Humanity has already entered a period of Climate Overshoot (Period of time when warming increases past 1.5°C)
- Another important Hard Reality: excluded from the Net-Zero model are (i) carbon looping (e.g. permafrost methane release), (ii) tipping points (e.g. AMOC collapse), (iii) carbon bombs (e.g. continued and expanded, additional massive fossil fuel use) and (iv) perpetual wars which are contributing to more GHG/Heat that all continue to warm the planet.
- Anything other than "R/R" of GHG/Heat and cooling the planet is a distraction and does not contribute to humanity's survival (See: illusion of Solutions).
- Despite decades of global warming discussions and climate pledges by all nations ([more than 80% of countries have failed to submit pledges](#)), nothing has been implemented to cause "R/R" of GHG/Heat and cooling the planet, the only criteria that matters for humanity's survival.

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 (~16,500GW)



- ▶ “Y” Cap, peak and turndown of GHG/Heat: For humanity to be safe it must **Remove** accumulated GHG/Heat and **Reduce** new GHG/Heat (“R/R”) that has been increasing at a rate of 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute or 365 million Hiroshimas/year due to (i) carbon looping, (ii) tipping points, (iii) carbon bombs and (iv) war. Requires massive unknown amounts of zero carbon energy.

- ▶ “Z” Safe Harbor: Humanity implements massive geoengineering and R/R solutions. This requires human intervention, new technologies to deliver GHG/heat reduction/removal and additional massive unknown amounts of zero-carbon energy. Requires possibly 10x more energy than that needed to reach W and X (~216,720GW) or more. We will need climate scientist and experts to calculate this.

Executive Summary

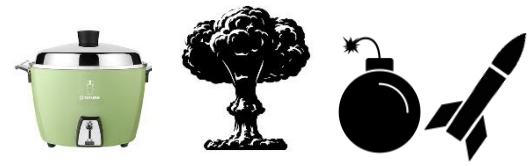
- **At the current (2023) rate of zero-carbon energy production 3,720GW (1.4% growth per year), Humanity:**
 - ▶ Achieves Energy Transition (W) in 63 years (2086)
 - ▶ Achieves Decarbonization/Net-Zero (X) in 122 years (2145)
 - ▶ Achieves Y and Z in 294 years (2317)
- **Humanity is experiencing mass 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 **174x**
 - ▶ To reach Y and Z in 1 year, Humanity must increase zero-carbon energy production by **4027x**
- **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: 16,500 x 1GW zero-carbon energy (SMRs)
 - ▶ Reach Y and Z: 216,720 x 1GW zero-carbon energy (SMRs)

Higher Temperature

Lower Temperature

Global Warming

For Humanity to be Safe it Must Remove Accumulated GHG/Heat and Reduce New GHG/Heat ("R/R") (11 Hiroshima bombs/second or 660 Hiroshima bombs/minute) for W, X, Y and Z



"Y" Climate Overshoot Continues Until "Y". This is "Terminal Velocity" of Rising GHG/Heat and Peak/Cap Before Downturn Begins

[See Attachment Y](#)

"Even if we reached Net-Zero today, warming will continue due to GHG positive feedback loops that lead to a runaway greenhouse effect and climate inertia" - Dr. David King

For Humanity to be Safe it Must Remove Accumulated GHG/Heat and Reduce New GHG/Heat to Go from "W" to "X" to "Y" and then to "Z". This Requires Human Intervention and Huge Amounts of Renewable Energy to Achieve R/R

"Z:" Safe Harbor for Humanity: 350 PPM

[See Attachment Z](#)

"X": Humanity Decarbonizes and Reaches Net-Zero. GHG/Heat Still Rising

[See Attachment X](#)

"W": Humanity Completes Energy Transition. GHG/Heat Still Rising

[See Attachment W](#)

"Today, the GHG level in the atmosphere exceeds 500 PPM, compared with the pre-industrial level of 275ppm" - Dr. David King

A safe level for humanity is about 350ppm, so we must remove excess GHG at about 10-20 billion tons per year" - Dr. David King



Past

"W" Replace Fossil Fuels with Zero-Carbon Energy

"X" Decarbonization of Electric, Industrial, Buildings, Transport and Agriculture Sectors (Direct Human Emissions)

"Y" Rising GHG/Heat Peak/Cap Before Downturn Begins

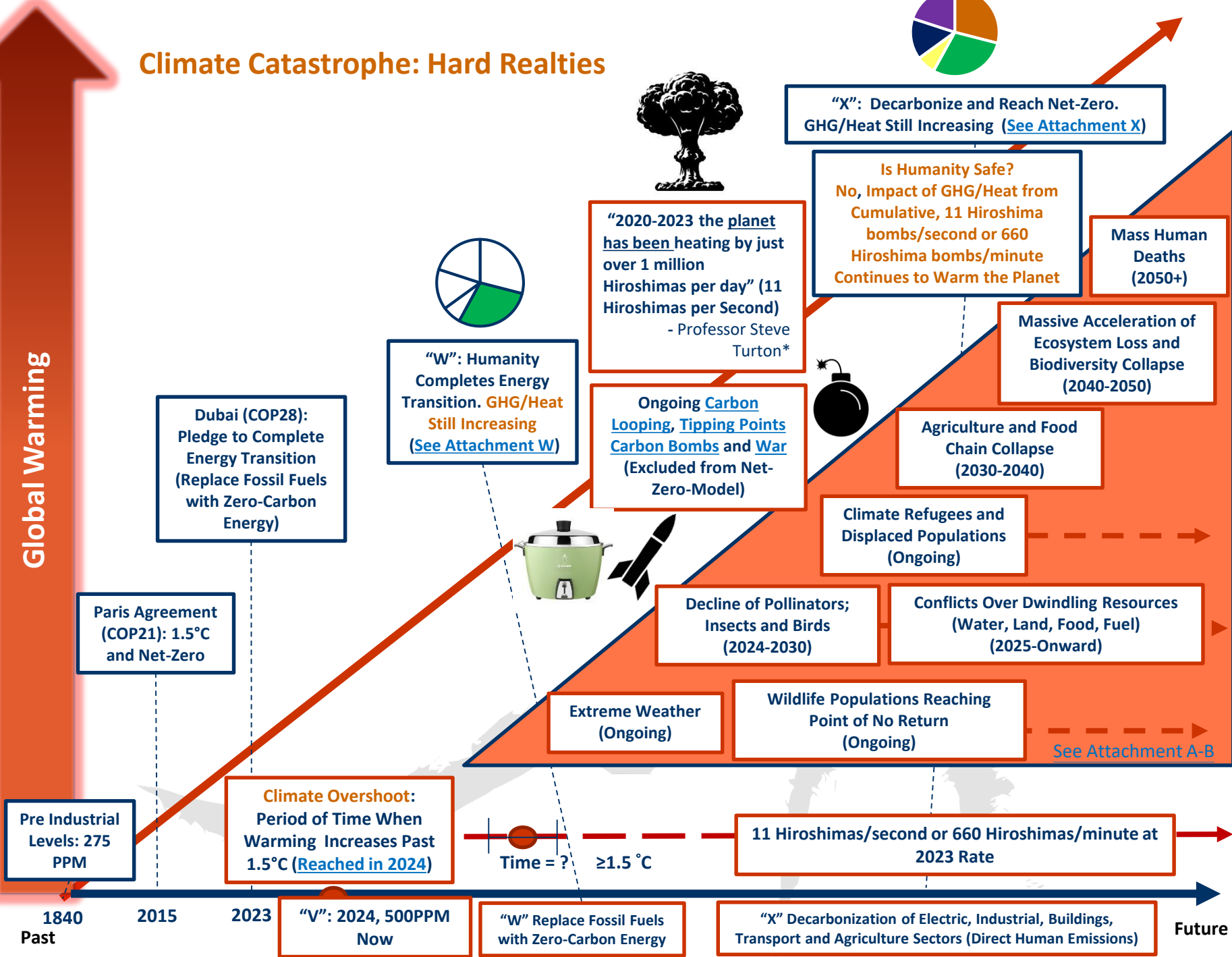
"Z" Safe Harbor for Humanity: 350 PPM

Climate Catastrophe: Hard Realities

Higher Temperature

Lower Temperature

Global Warming



Pre Industrial Levels: 275 PPM

Paris Agreement (COP21): 1.5°C and Net-Zero

Dubai (COP28): Pledge to Complete Energy Transition (Replace Fossil Fuels with Zero-Carbon Energy)

Climate Overshoot: Period of Time When Warming Increases Past 1.5°C (Reached in 2024)

"V": 2024, 500PPM Now

Time = ? $\geq 1.5^\circ\text{C}$

"W" Replace Fossil Fuels with Zero-Carbon Energy

11 Hiroshimas/second or 660 Hiroshimas/minute at 2023 Rate

"X" Decarbonization of Electric, Industrial, Buildings, Transport and Agriculture Sectors (Direct Human Emissions)

"W": Humanity Completes Energy Transition. GHG/Heat Still Increasing (See Attachment W)

Ongoing Carbon Looping, Tipping Points Carbon Bombs and War (Excluded from Net-Zero-Model)

"2020-2023 the planet has been heating by just over 1 million Hiroshimas per day" (11 Hiroshimas per Second) - Professor Steve Turton*

"X": Decarbonize and Reach Net-Zero. GHG/Heat Still Increasing (See Attachment X)

Is Humanity Safe? No, Impact of GHG/Heat from Cumulative, 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute Continues to Warm the Planet

Mass Human Deaths (2050+)

Massive Acceleration of Ecosystem Loss and Biodiversity Collapse (2040-2050)

Agriculture and Food Chain Collapse (2030-2040)

Climate Refugees and Displaced Populations (Ongoing)

Decline of Pollinators; Insects and Birds (2024-2030)

Conflicts Over Dwindling Resources (Water, Land, Food, Fuel) (2025-Onward)

Extreme Weather (Ongoing)

Wildlife Populations Reaching Point of No Return (Ongoing)

See Attachment A-B

1840

2015

2023

Future

Climate Catastrophe: Hard Realities

Continued From Previous Slide

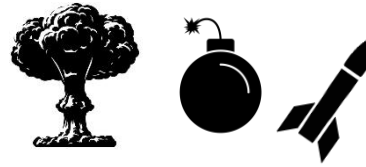


"X": Humanity Decarbonizes and Reaches Net-Zero

Politicians and Mainstream Media Have Inaccurately Implied that Reaching Net-Zero Means Humanity Is Safe. How Can Humanity be Safe? This Makes No logical Sense. The World Has Not Cooled Down

Unfortunate Reality: Humanity is Not Safe
Impact of GHG/Heat from Cumulative, Past 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute Continues to Warm the Planet. There Has Been No Reduction/Removal of GHG/Heat

Humanity Needs to Reduce/Remove GHG/Heat from Before and After Reaching Net Zero. Humanity is Still in Danger



Trapped GHG Emissions From Both Before and After Net-Zero Prevents Heat From Escaping the Atmosphere and Continues to Heat it ≥ 11 Hiroshima bombs/second or 660 Hiroshima bombs/minute



In Fact, the Planet Has Not Yet Reached "Terminal Velocity" of GHG/Heat Increase. (i) Carbon Looping, (ii) Tipping Points, (iii) Carbon Bombs and (iv) War Excluded from Net-Zero Model (Triggered by Indirect Human Activity and Degrading Ecological Systems) [Orange Triangle on Previous Slide] Cause more GHG/Heat Which Continues to Warm the Planet, Including:

- 7 of the 8 Planetary Ecological Systems Have Passed Tipping Points (See Attachment A-B)
- Massive Methane Release from Permafrost Melt
- Fertile Soil and Agriculture Disappearing
- AMOC Collapse
- Ocean Current Collapse
- Coral Reef Die-off
- Habitat Destruction
- Rainforest Destruction
- Freshwater Scarcity
- Desertification
- 6th Mass Extinction

GHG/Heat and Climate Overshoot Continues and GHG/Heat Continue to Rise Until We Reach "Y". This is "Terminal Velocity" of Rising GHG/Heat and Peak/Cap Before Downturn Begins. This Downturn/Slowdown of "Terminal Velocity" will Not Happen Naturally.

Is Humanity Safe?
No, GHG/Heat Continue to Warm the Planet. GHG/Heat Must be Reduced/Removed from the Atmosphere to Reach Safe Harbor "Z".

GHG and Heat Must be Removed from the Atmosphere to Get from "X" to "Y" to "Z". This Requires Human Intervention and Mass Amounts of Zero-Carbon Energy to Deliver GHG/Heat Reduction/Removal to Get to "Z"

"Z:" Safe Harbor for Humanity: 350 PPM

Climate Overshoot: The longer the Overshoot, the more heat and GHG accumulates and the planet cooks. GHG/Heat must be removed to reach safe harbor (350PPM) "Z"

Higher Temperature

Global Warming

Lower Temperature

Past

"X" Decarbonization of Electric, Industrial, Buildings, Transport and Agriculture Sectors (Direct Human Emissions)

"Y" Rising GHG/Heat Peak/Cap Before Downturn Begins

"Z:" Safe Harbor for Humanity: 350 PPM

Future

Higher Temperature

Lower Temperature

Global Warming

For Humanity to be Safe it Must Remove Accumulated GHG/Heat and Reduce New GHG/Heat ("R/R") for W, X, Y and Z

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

"W": Humanity Completes Energy Transition. GHG/Heat Still Rising



~5,172GW Needed to Complete Energy Transition


"X": Humanity Decarbonizes and Reaches Net-Zero. GHG/Heat Still Rising




~16,500GW Needed to Achieve Decarbonization and Net-Zero

~21,672GW Total

Additional Massive Unknown Amounts of Zero-Carbon Energy Are Needed to R/R GHG/Heat from Carbon Looping and Tipping Points to Reach Y



Additional Massive Unknown Amounts of Zero-Carbon Energy Are Needed to R/R GHG/Heat from Carbon Bombs and War to Reach Y



Additional Massive Unknown Amounts of Zero-Carbon Energy Are Needed to R/R GHG/Heat to Reach Safe Harbor Z

"Y" Climate Overshoot Continues Until "Y". This is "Terminal Velocity" of Rising GHG/Heat and Peak/Cap Before Downturn Begins

Will Require At Least Between 1x-10x (or More) Zero-Carbon Energy Than That Needed to Reach W+X

Estimated Total Additional Amount of Zero-Carbon Energy to Reach Safe Harbor (Y+Z):
1x = 21,672GW
10x = 216,720GW

To Achieve Energy Transition and Decarbonization/Net-Zero (W+X)

"Z:" Safe Harbor for Humanity: 350 PPM

Past

"W" Replace Fossil Fuels with Zero-Carbon Energy

"X" Decarbonization of Electric, Industrial, Buildings, Transport and Agriculture Sectors (Direct Human Emissions)

"Y" Rising GHG/Heat Peak/Cap Before Downturn Begins

"Z" Safe Harbor for Humanity: 350 PPM

Reality of Current Climate Catastrophe:

Life Ending Occurrence ("LEO")

Is Humanity a Species Too Stupid to Survive?

Big Global Stage for Politicians, Mainstream Media, Financial and Fossil Fuel Industries

- Rio (1992)
- Paris COP21 (2015)
- Dubai COP28 (2023)

Set Goals of 1.5°C and Net-Zero
All Talk, No Implementation/Enforcement/Action
Nothing About Cooling
No Parachute

Reality: Big Problem: No Removal of Accumulated GHG/Heat or Reduction of New GHG/Heat ("R/R")

"It is a tale told by an idiot, full of sound and fury, signifying nothing."
- Macbeth, Shakespeare

No Action: No R/R of Accumulated and New GHG/Heat. Spinning Wheels, No Traction

- Maximize Shareholder Profit of Fossil Fuels and Finance Industry Continues
 - Lending, Investing and Insuring 100% correlated with Fossil Fuels
- Check-the-Box Regulatory Practices
 - Wrong Mentality and Standards
 - Greenwash and Pay-to-Pollute Schemes
 - Fragmented ESG Chaos
 - Conflicts of Interest

None of These Has Caused Any R/R of GHG/Heat
There is No Slow Down of Rising GHG/Heat

As GHG/Heat Increases
Freefall Velocity Increases

Reality: No R/R
GHG/Heat
Consistently Rising

11 Hiroshima
bombs/second or 660
Hiroshima
bombs/minute

No R/R
Only Accelerating
Global Warming
No Slowdown of
Freefall

No Parachute



Human Extinction

"The way to Dusty Death"
-Macbeth

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



X: Decarbonization
and Net-Zero



Carbon Looping,
Tipping Points

Carbon Bombs, War



Y: Rising GHG/Heat
Never Peaks/Caps
Before Downturn
Begins "Terminal
Velocity"
No Parachute!

Z: Safe Harbor for
Humanity: 350 PPM

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

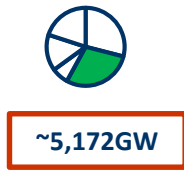


This Will Require a Collective Effort from Governments, Industry, Universities, Experts, New Technologies, Financial Industry, Professors, NGOs and Nations

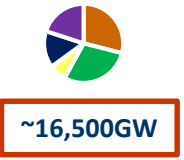


Humanity Reaches Soft Landing/Safe Harbor

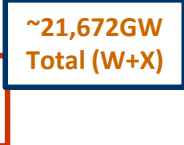
W: Energy Transition Replace Fossil Fuels with Zero-Carbon Energy



X: Decarbonization and Net-Zero



Carbon Looping, Tipping Points



Carbon Bombs, War



(~216,720GW) 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

"Illusion of Solutions*: Pay-to-Pollute"

Higher Temperature

Lower Temperature

Global Warming

Fossil Fuels Industry Uses the Same Tactics the Tobacco Industry Used to Deny that Smoking Causes Cancer

Removing Accumulated GHG/Heat and Reducing New GHG/Heat ("R/R") Is the Only Criteria that Matters for Humanity's Survival

Anything Other Than R/R" of GHG/Heat and Cooling the Planet is a Distraction, So Fossil Fuel Industry and Their Cooperators (Governments, Financiers, Industry, Media) Continue to Profit

"When others asked the truth of me, I was convinced it was not the truth they wanted, but an illusion they could bear to live with."
- Anais Nin, French-American Essayist

Illusion of Solutions

It is unfathomable that 55 years after the first Earth Day, and that after decades of Global Warming discussions, humans remain blind to the fact that the only criteria that matters for humanity's survival is global cooling and R/R of GHG/Heat. Humanity's spotlight must be laser focused on deploying mass global solutions i.e. R/R of GHG/Heat.

Distractions, Delays and Obstructions to Prevent R/R Used by Fossil Fuel Industry and Their Cooperators (Governments, Financiers, Industry, Media). Financial Institutions and Investor's Profits are 100% Linked to Fossil Fuel Use and Expansion (See: [Financial Institution's Profits 100% Linked to Fossil Fuels](#)) (See: [Government Fossil Fuel Subsidies 7T/Yr](#)):

Spinning Wheels, No Traction: Appears Most Often As:

- **Misinformation (Media):**
 - Cast Doubt on Science
 - Manipulate Public Perception
 - Funding of Pseudoscientific Studies
 - Misrepresent Scientific Consensus
- **Greenwash and Pay-to-Pollute Schemes (Finance and Fossil Fuel Industries):**
 - **Carbon Mechanisms (Carbon Credits, Carbon Offsets, Etc.)**
 - Check the Box Filing Systems, Which do not Focus on of R/R GHG/Heat
 - A Cluster of Chaotic **ESG/Equator Principles** Programs Focused on Everything Except GHG/Heat R/R (120 ESG Programs in US Alone)
 - Accounting Rules Based on Incomplete Criteria, Which do not Focus on of R/R GHG/Heat
- **Inadequate Climate Policy and Regulation (Governments, Passive Participants):**
 - Climate Policies that Do Not Lead to R/R
 - Fossil Fuel Subsidies
 - Delays in Regulatory Reforms and Enforcement

Fossil fuel companies, are aware of the connection between fossil fuel combustion and climate change as early as the 1970s if not earlier.

32+ Years of Big Stage Global Climate Conferences and Pledges Have Not Led to Any R/R of GHG/Heat

Scientists from the Fossil Fuel Industry began to be concerned about air pollution and its effects on health and the Environment

Climate Disinformation by Climate Deniers, Lobbyists, Media and Political Contributors to Obstruct Climate Action

Pre Industrial Levels: 275 PPM

None of These Lead to Cooling or R/R of GHG/Heat Fossil Fuel Companies Continue to Profit

Climate Overshoot

11 Hiroshima bombs/second or 660 Hiroshima bombs/minute at 2023 Rate

Past 1840 1920's 1950's + 1970's
Earth Day One, April 22nd, 1970

Future
*"The ruling class maintains its dominance by creating an "Illusion of Consensus" -Antonio Gramsci

Higher Temperature

Global Warming

Lower Temperature

Past

Future



Humanity has less than a five-year window to take decisive action on climate change...We must realign our political will, economic priorities and societal values...We are a part of the natural world and depend on it...we are facing a self-inflicted set of global challenges, the need for such a cultural transformation will drive action. This process must begin now.

- Sir David King, Former UK Chief Scientist, Advisor to Prime Ministers Blair and Brown

"On average over the last 3 years, the planet has been heating by just over 1 million Hiroshimas per day. (11 Hiroshimas per second)"

- Steve Turton, Central Queensland University Australia, Environmental Geography, Adjunct Professor

"The temperature rise we found is much larger than the 2.3 to 4.5°C that the UN IPCC, has been estimating...A doubling of the amount of CO2 in the atmosphere could cause an increase in the average temperature... from 7°C to even a maximum of 14°C degrees."

- Royal Netherlands Institute for Sea Research (Dutch Government Research Institute with over 200 Scientists and Researchers) Nature Communications Magazine, June 2024

"This will be greater than anything we have ever seen in the past [10,000 years of human civilization]... Every living thing will be affected...we will not have anything left that we value, if we do not address the climate crisis."

- Katherine Hayhoe, Nature Conservancy, Chief Scientist

"2/3 of the world's population is under an effective death sentence due to climate change"

- Dr. Deborah Brosnan, Virginia Tech University, Adjunct Professor of Biology

Climate Impact on Taiwan Business and Supply Chains:

No Way for the Taiwan Government to Deliver 100% Zero-Carbon Energy by 2030

Higher Temperature

Global Warming

Lower Temperature

Past

Present

Future

Industries and Supply Chains that Do Not Meet Zero-Carbon Requirements Will Lose Access to Global Export Markets

Zero-Carbon Energy Required to Export (Brave New World)

EU Carbon Border Adjustment Mechanism ("CBAM")

2026

Multiple Global Supply Chains' Net-Zero Emissions Requirements:
-Google
-Apple
-Meta
-Amazon
-Others

2030-2040

Taiwan Government Fails to Deliver Zero-Carbon Energy. Companies/Supply Chains Must Leave Before 2030 (6 Years Left)

Taiwan: Only 7% Delivered Zero-Carbon Energy

Mission Impossible: No Concrete Plan to Supply Scalable, Baseload, Zero-Carbon Energy (See: [Taiwan's Government Lacks the Ability to Generate Enough Energy to Maintain Taiwan's Technological Leadership Let Alone Become a Leader in AI](#))

From 2018-2023, Taiwan saw a 15% annual rise in outbound investment. Outbound investment increased 170% from 2023 to 2024. The Outbound Tsunami is Rising

Taiwan Government Considering Nuclear Energy vs 55+ Jurisdictions Expanding Nuclear Energy

"The Shift"

Because the ROC Government has Failed to Deliver 100% Zero-Carbon Energy by 2030, All Traditional Industries, Tech, Semiconductors and AI are Shifting out of Taiwan. They Only Have 6 Years (2030) Left to Implement Their Shift Strategy.

Asian Supply Chains Have Already Started Mass Migrating (Shift) to 30+ Zero-Carbon Energy Manufacturing Jurisdictions

"Y" Rising GHG/Heat Peak/Cap Before Downturn Begins (Massive Unknown Amounts of Zero-Carbon Energy)

Extreme Weather (Ongoing)

Climate Refugees and Displaced Populations (Ongoing)

Conflicts Over Dwindling Resources (Water, Land, Food, Fuel) (2025-Onward)

Mass Human Deaths (2050+) (26 Years)

"Z:" Safe Harbor for Humanity: 350 PPM (Massive Unknown Amounts of Zero-Carbon Energy)

Wildlife Populations Reaching Point of No Return (Ongoing)

Decline of Pollinators; Insects and Birds (2024-2030)

Agriculture and Food Chain Collapse (2030-2040)

Massive Acceleration of Ecosystem Loss and Biodiversity Collapse (2040-2050)

Climate Overshoot: Period of Time When Warming Increases Past 1.5°C (Reached in 2024)

Humanity's Survival Prospects

Higher Temperature

Global Warming

Lower Temperature

Past

Present

Future

Reaching Energy Transition ("W") and Net-Zero/Decarbonization ("X") at Current Rate of Production (Renewables 3,342GW + Nuclear 378GW = 3,720GW) (2023)

"W": Humanity Completes Energy Transition.

(~5,172GW) 65 Years (~2088) to Achieve at Current Rate of Production (2023, ~3,448GW)

"X": Humanity Decarbonizes and Reaches Net-Zero.

(~16,500GW) 126 Years (~2188) to Achieve at Current Rate of Production (2023, ~3,448GW)

~21,672GW Total

At the Current Zero-Carbon Energy Production Rate it is Too Late for Humanity (See Next Slides)

Reaching "Y" and then "Z" Will Take Massive, Incalculable Amounts of Zero-Carbon Energy. The More Time it Takes to Reach W and X the More Zero-Carbon Energy Will be Needed to Offset the Effects of the Overshoot

~216,720GW 294 Years to Achieve (~2317)

"Z:" Safe Harbor for Humanity: 350 PPM (Massive Unknown Amounts of Zero-Carbon Energy)

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Wildlife Populations Reaching Point of No Return (Ongoing)

Decline of Pollinators; Insects and Birds (2024-2030)

Agriculture and Food Chain Collapse (2030-2040)

Massive Acceleration of Ecosystem Loss and Biodiversity Collapse (2040-2050)

Climate Overshoot: Period of Time When Warming Increases Past 1.5°C (Reached in 2024)



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 16,500GW)

Years to Achieve Y and Z
(At Least 10x the Amount Need to
Reach X+Y (216,720GW))

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)
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Current (2023) Rate of Production (1.4% Growth Per Year) ¹ (Renewables 3,342GW + Nuclear 378GW = 3,720GW) ²	63 (2086)	122 (2145)	294 (2317)
During COP28, Countries Pledged to Triple Nuclear Energy by 2050 ³ (Assume Renewables Maintain Current Rate)	52 (2075)	106 (2129)	272 (2295)

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)	34 (2055)	64 (2084)	174 (2,197)
8x Current Rate of Production (11.2% Growth Per Year)	9 (2031)	16 (2038)	38 (2061)

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 16,500GW)	Years to Achieve Y and Z (At Least 10x the Amount Need to Reach X+Y (216,720GW))
10x Current Rate of Production (14% Growth Per Year)	7 (2029)	13 (2035)	30 (2053)
<p>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</p>			
18x Current Rate of Production (25.2% Growth Per Year)	4 (2027)	8 (2031)	17 (2040)
<p>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</p>			
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)
174x Current Rate of Production (243% Growth Per Year) Achieve Net-Zero/Decarbonization in 1 Year		Zero-Carbon Energy Must be Deployed at 174x the Current Rate To Achieve Net-Zero/Decarbonization in 1 Year (2024) (16,500GW)	3 (2026)
4027x Current Rate of Production (5,637% Growth Per Year) Reach Safe Harbor in 1 Year			Zero-Carbon Energy Must be Deployed at 4027x the Current Rate To Reach Y and Z in 1 Year (2024) (216,720GW)



Humanity's Survival Prospects

Higher Temperature

Global Warming

Lower Temperature

Past

Present

Future

Business As Usual

At the Current Rate of Zero-Carbon Energy Production Humanity Reaches W in 63 Years (2086)

At the Current Rate of Zero-Carbon Energy Production Humanity Reaches X in 122 Years (2145)

At the Current Rate of Zero-Carbon Energy Production Humanity Reaches Y-Z in 294 Years (2145)

Too Late for Humanity to Survive

Humanity Increases Zero-Carbon Energy Production by 100x

Humanity Reaches W in 1 Years (2024) 5,172GW

Humanity Reaches X in 2 Years (2025) 16,500GW

Humanity Reaches Y-Z in 6 Years (2029) 216,720GW

Humanity is Safe

Extreme Weather (Ongoing)

Climate Refugees and Displaced Populations (Ongoing)

Conflicts Over Dwindling Resources (Water, Land, Food, Fuel) (2025-Onward)

Mass Human Deaths (2050+) (26 Years)

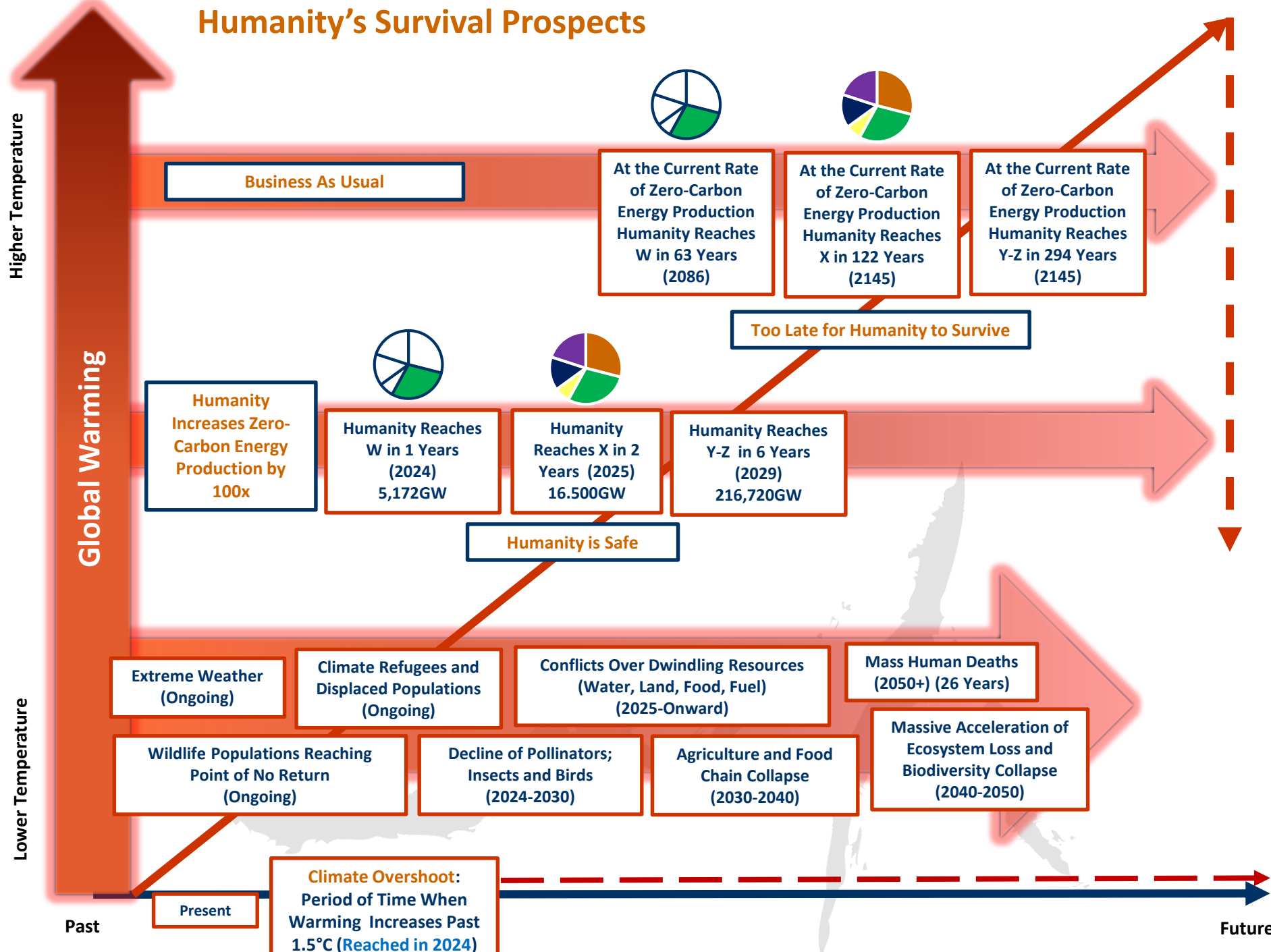
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Humanity's Survival Prospects: Humanity Must Reach W, X, Y and Z to Reach Safe Harbor

- **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**
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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 **174x**
 - ▶ To reach Y and Z in 1 year, Humanity must increase zero-carbon energy production by **4027x**
- **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: 16,500 x 1GW zero-carbon energy (SMRs)
 - ▶ Reach Y and Z: 216,720 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



For More Information

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