IN THE SUPREME COURT OF THE STATE OF MONTANA

Case No. DA 23-0575

RIKKI HELD, et al.

Plaintiffs and Appellees,

vs.

STATE OF MONTANA, et al.

Defendants and Appellants.

On Appeal from the First Judicial District Court, Lewis and Clark County, Cause No. CDV-2020-307, the Hon. Kathy Seeley, Presiding.

AMICUS CURIAE BRIEF IN SUPPORT OF APPELLANTS

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I. THE FRIENDS OF THE COURT SUBMIT THIS EDUCATIONAL BRIEF FOR THE COURT'S BENEFIT IN ADDRESSING SCIENTIFIC PRINCIPLES UNDERLYING THE CASE AND TO HELP IT UNDERSTAND THE SCIENTIFIC POLICY ANALYSES UNDERLYING ADOPTION OF THE STATUTES AT ISSUE.

This amicus curiae brief is offered to bring to the attention of the Court relevant scientific matter not already brought to its attention by the parties. Given the tricky and important problem of statutory interpretation, and the presumption that statutory enactments are constitutional, it is appropriate for legislators to offer the Court their help. The scientific discussion below is designed to provide the Court with a rigorous context that was not present in the analysis of the issues decided in the court below.

This brief is also offered to demonstrate that the scientific inquiry at issue is not justiciable. The issues at play are suited to decision by the political branches of government. "All political power is vested in and derived from the people. All government of right originates with the people, is founded upon their will only, and is instituted solely for the good of the whole." Mont. Const. art. II, § 1. Justiciability considers, *inter alia*, whether an issue is purely political. *See, Larson v. State By & Through Stapleton*, 2019 MT 28, ¶ 18, 394 Mont. 167, 434 P.3d 241. "Though not determinative of the existence or extent of a court's subject matter jurisdiction, justiciability is a mandatory prerequisite to the initial and continued

exercise of that jurisdiction." *Id.* "The 'political question doctrine [generally] excludes from judicial review [only] those controversies ... which revolve around policy choices and value determinations constitutionally committed for resolution to' other branches of government or to the people in the manner provided by law." *Id.*, ¶ 39. (quoting *Japan Whaling Ass'n v. Am. Cetacean Soc'y*, 478 U.S. 221, 230 (1986).) "In contrast, it is particularly within the province of the judiciary to construe and adjudicate provisions of constitutional, statutory, and the common law as applied to facts at issue in particular cases." *Id.*

Here, at trial, the plaintiffs were unable to competently grapple with the data—so they relied instead on scientific consensus. To prove the "climate science" consensus, the plaintiffs offered only two expert witnesses. (Findings of Fact, Conclusions of Law, and Order 17:19-18:3, Aug. 14, 2023.) One, Dr. Steven Running, is a Nobel Laureate—but not for any branch of science. (*Id.*, 17:19-18:8.) The other was Dr. Cathy Whitlock, who explained that a consensus of scientists believes greenhouse gasses emitted worldwide is impacting Montana's climate. No testimony was offered as to how GHG emissions by Montanan's has any detectible effect on the Montana climate. Based on the testimony of these two witnesses, the district court made a finding that resolves climate science for all of the citizens of the State of Montana, present and future.

Meanwhile, the court did not weigh the impact of renewable energy on the climate of Montana. Implied by this omission is that there is no environmental cost of renewable energy—a factual proposition without any basis in the evidence in the record. (Id., 80:7-84:16.) In fact, renewable energy alternatives will create growing market demand for "aluminum (including its key constituent, bauxite), cobalt, copper, iron ore, lead, lithium, nickel, manganese, the platinum group of metals, rare earth metals including cadmium, molybdenum, neodymium, and indium—silver, steel, titanium and zinc."[1] That mining is not environmentally cost free is capable of judicial notice. Yet, nowhere in the record below is there any consideration of how burgeoning mining for this long list of minerals will impact Montanan's constitutional right to a clean and healthful environment. This elementary omission from the cost benefit analysis incumbent on science based environmental regulation demonstrates conclusively the limitations on the Judiciary as a comprehensive environmental policy agent.

[1] Arrobas,Daniele La Porta; Hund,Kirsten Lori; Mccormick,Michael Stephen; Ningthoujam,Jagabanta; Drexhage,John Richard, *The Growing Role of Minerals and Metals for a Low Carbon Future (English).* Washington, D.C.: World Bank Group. http://documents.worldbank.org/curated/en/207371500386458722/The-Growing-Role-of-Minerals-and-Metals-for-a-Low-Carbon-Future

In sum, the climate science at issue is entirely too complex to be decided by a trial court under the guidance of any two scientists, regardless of their ability. And the impact of the decision will range far beyond the parties to the case. The Montana Legislature, not the Judiciary, is the constitutional body properly charged with weighing the evidence and the interests of the state's people in resolving the policy choices and value judgments necessarily at issue in this case. Mont. Const. art. II, § 1. The matter, therefore, involves a non-justiciable political question that cannot be decided by a court.

II. SCIENTIFIC DISCUSSION

A. Science must follow the Scientific Method.

The Scientific Method originated 4000 years ago. Today, it is part of the Philosophy of Science. It is not an arbitrary set of rules. It is the only way to find truth in science. Figure 1 illustrates the Scientific Method.

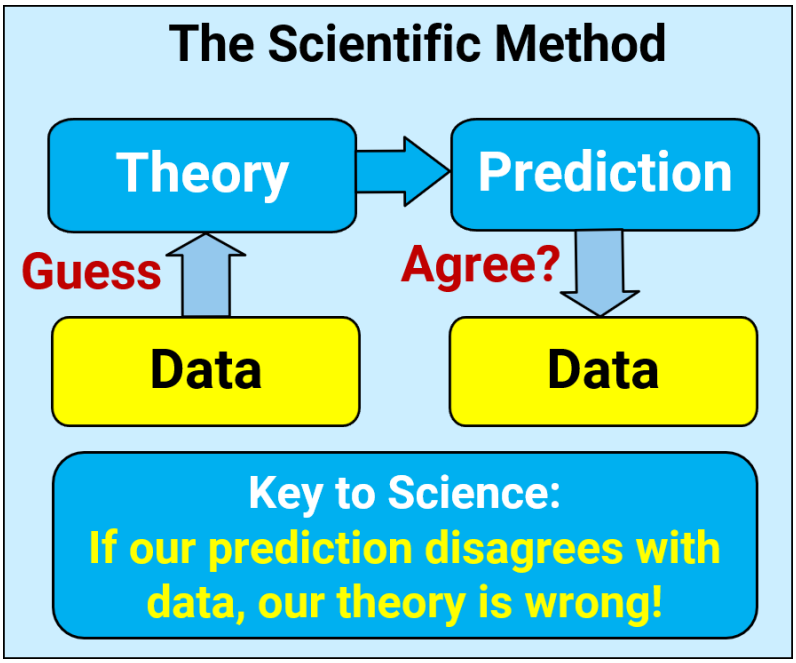

Figure 1. The scientific method.

John Kemeny (1959) taught the Scientific Method at Dartmouth College in the 1960's using his book *A Philosopher looks at Science*. Richard Feynman, Nobel Laureat in Physics, taught the same Scientific Method. A theory (or hypothesis or idea) is a proposed connection of cause and effect.

All hypotheses or theories begin and end with data. Using data, scientists guess hypotheses they think can predict new data. To test their hypotheses, scientists make predictions. Then they compare their prediction with new data. All true theories or hypotheses must be falsifiable.

If their prediction is correct, their hypothesis may be correct, but successful predictions do not prove a hypothesis is true because the next experiment may

prove our hypothesis is false. Albert Einstein said, many experiments may prove him right but it takes only one experiment to prove him wrong. If one prediction disagrees with data, the theory or hypothesis is false. That is the key to science.

B. Plaintiffs assume three hypotheses are true.

Plaintiffs' arguments are based on three unstated hypotheses:

- H1: Human CO_2 causes all the CO_2 increase.
- H2: More CO_2 increases global warming.
- H3: Global warming causes bad stuff to happen.

Plaintiffs claim because H3 is true, H1 and H2 must be true, fallaciously arguing that events prove their cause. Here, the amicus parties will use data to falsify H1 and H2.

C. Consensus is not science and models are not evidence.

Consensus is not science, climate model calculations are not evidence, and predictions are not data. The climate models used in this case assume H1 and H2 are true, so the model predictions are not evidence that H1 and H2 are true. To the extent the district court relied on models, it was not relying on evidence.

The following paragraphs from the trial court's Findings of Fact, and the associated hypotheses, are relevant:

> **71. (H1)** A substantial portion of CO_2 emitted by human activities persists in the atmosphere for as long as hundreds of years or millennia. As a result, CO_2 steadily accumulates in the atmosphere.

78. (H2) The rise in atmospheric CO_2 has caused global, national, and Montana air temperatures to rise.

82. (H2) The Earth's energy imbalance (EEI) is the most critical metric for determining the amount of global heating and climate change.

85. (H2) If more GHGs are added to the atmosphere and more incoming energy received from the sun is trapped as thermal energy, the Earth's climate system will continue to heat up.

87. (H1, H2) The buildup of CO_2 and the current Earth energy imbalance is due to anthropogenic changes in the environment, not natural variability.

Plaintiffs' (2023) Expert Report by Steve Running and Cathy Whitlock assumes H1 and H2 are true, and incorrectly uses "consensus" and "climate model projections" as "evidence."

They make the following six invalid claims related to H1 or H2:

1. **(H1)** If GHG emissions continue to increase, atmospheric CO_2 concentrations will continue to climb.
2. **(H1)** Human CO_2 remains in the atmosphere for thousands of years.
3. **(H1)** Carbon isotopes prove fossil fuels are the source of increasing CO_2.
4. **(H2)** CO_2 causes global warming.
5. **(H2)** The increased CO_2 has disrupted Earth's energy balance.
6. **(H2)** Until atmospheric CO_2 concentrations are reduced to 350 ppm, Earth's energy balance will continue to be positive.

Plaintiffs did not present evidence—in the form of data—to support their claims.

By contrast, we prove H1 and H2 are false.

D. Facts are not up for a vote.

Plaintiffs' Expert Report by Steve Running and Cathy Whitlock says:

> There is a scientific consensus that the rise in atmospheric CO_2 that we are witnessing is attributable to human activities, primarily the burning of fossil fuels.
>
> [T]he vast majority of actively publishing climate scientists – 97 percent – agree that humans are causing global warming and climate change. Most leading science organizations around the world have issued public statements expressing this, including international and U.S. science academies, the United Nations Intergovernmental Panel on Climate Change, and a whole host of reputable scientific bodies around the world.

Aristotle showed the consensus argument fails. Wikipedia (2023) says,

> *argumentum ad populum* is a fallacious argument which is based on claiming a truth because the majority thinks it is true.
>
> *Argumentum ad populum* is similar to an argument from authority (*argumentum ad verecundiam*). It uses an appeal to the beliefs of a group of people, stating that because a certain opinion is held by a majority, it is therefore correct.

A geocentric solar system was once the consensus. Then came Copernicus and Galileo.

Plaintiffs argue H1 and H2 are true because the scientific consensus, which will never appear in court for cross-examination, hold these hypotheses as true. Yet, Clintel (2023) – *World Climate Declaration: There is no Climate Emergency* – shows the opposite. It is signed by 1609 professional scientists who disagree with the Plaintiffs' claims, as follows**:**

1. Climate models have many shortcomings and are not remotely plausible as global policy tools. They exaggerate the effect of greenhouse gases such as CO_2.

2. CO_2 is not a pollutant. It is essential to all life on Earth. It is also good for agriculture, increasing the yields of crops worldwide.

3. There is no statistical evidence that global warming is intensifying hurricanes, floods, droughts and such like natural disasters, or making them more frequent. However, there is ample evidence that CO_2 mitigation measures are as damaging as they are costly.

Scientific truth is determined not by consensus or votes but by proving hypotheses are false.

E. Scientists are bound by the "Null Hypothesis."

Scientists must assume human CO_2 is not liable until proof is offered to the contrary. Scientists call this the "Null Hypothesis."

F. IPCC's natural and human carbon cycles.

The next nine sections (F through N) contain seven proofs that H1 is false. This is high-school physics and also common sense. It is based on the peer-reviewed papers by Berry (2021, 2023).

Figure 2 shows the *Intergovernmental Panel on Climate Change* (IPCC, 2013, p. 471, Figure 6.1) natural carbon cycle and human carbon cycles. IPCC assumes (H1) that natural CO2 level stayed constant at 280 ppm after 1750 and human CO_2

caused all the CO_2 increase above 280 ppm. This assumption (H1) is the foundation of the Plaintiffs' case as well as our rebuttal to the Plaintiffs' case.

IPCC's units in Figure 2 are PgC (petagrams of carbon). PgC is numerically equal to Gigatons of carbon (GtC). We use GtC for levels and GtC per year for the flows of carbon between the reservoirs.

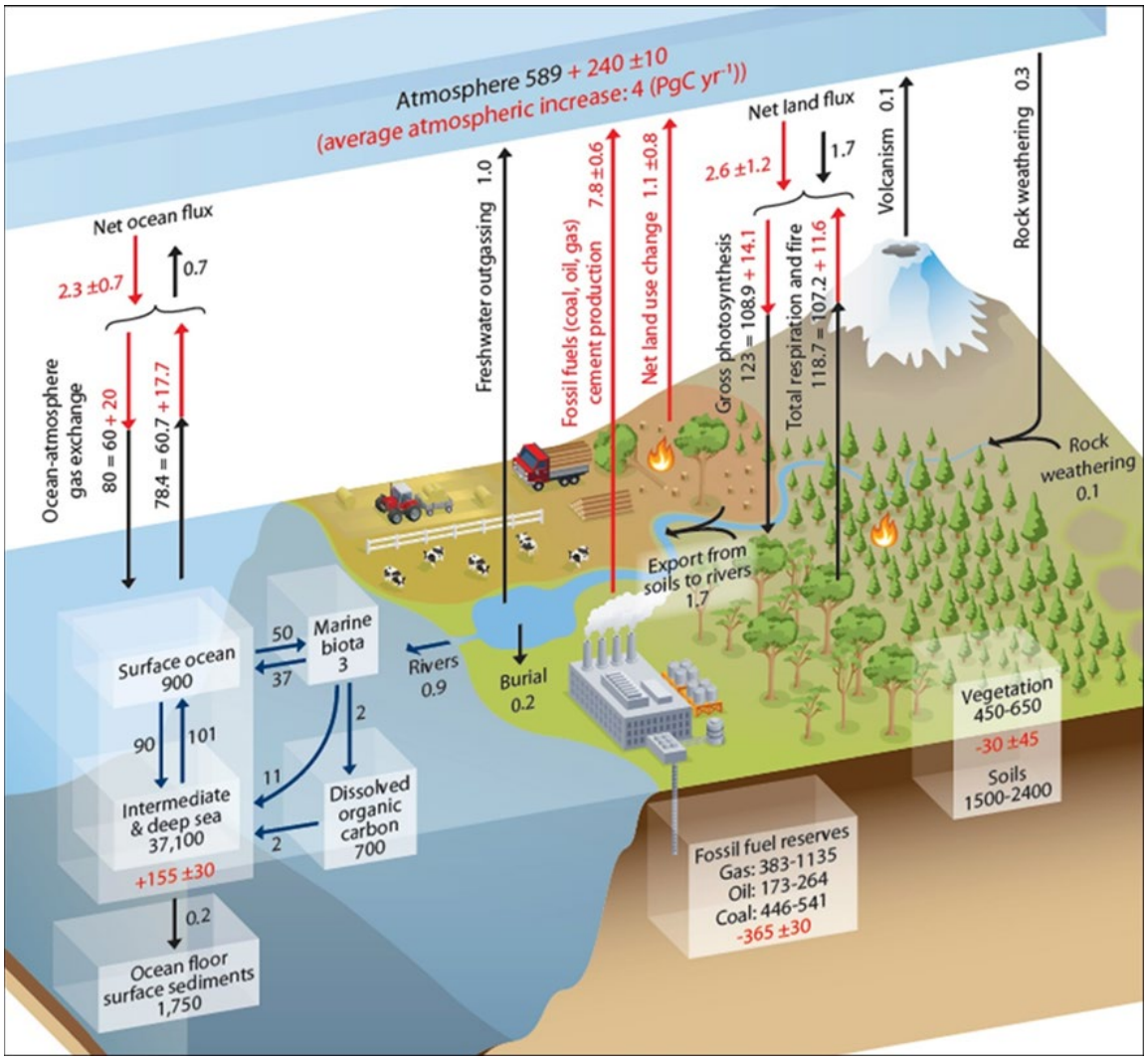

Figure 2. IPCC's (2013, p. 471, Figure 6.1) human (red) and natural (black) carbon cycles. Data is in GtC or GtC per year.

Figure 3 shows IPCC's natural and human carbon cycles as described in Figure 2. IPCC's natural carbon cycle is at equilibrium, which makes the flows between the reservoirs equal. Natural atmospheric CO_2 is 280 ppm (~ 589 GtC) based on data that IPCC says is accurate to about 20 percent.

The total human carbon addition to the carbon cycle is about 400 GtC, which is one percent of nature's total of 40,000 GtC. That alone should beg questions about how the addition of human CO_2 can be catastrophic.

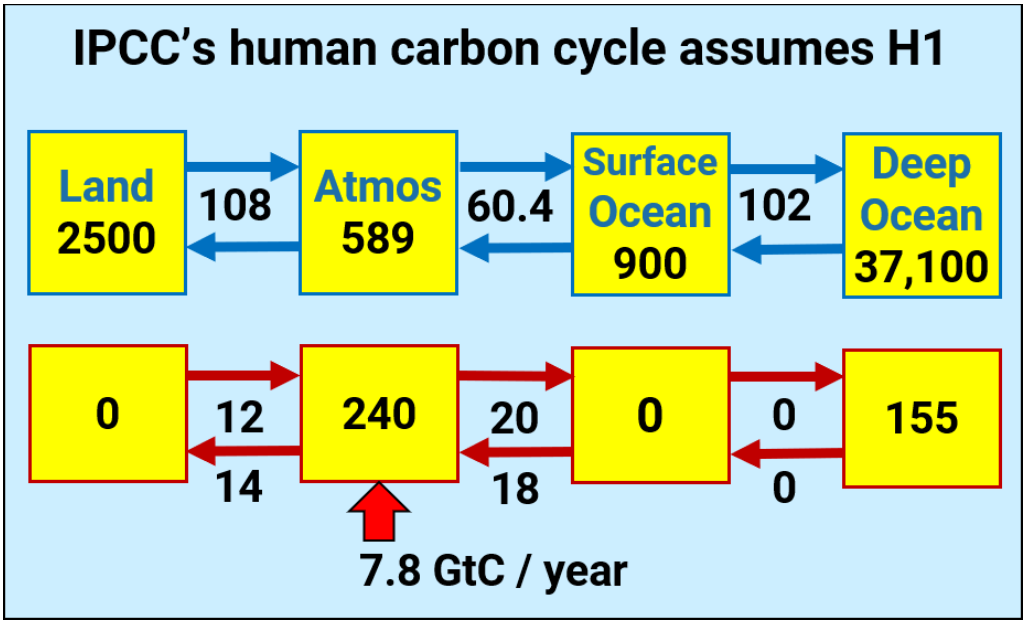

Figure 3. IPCC's natural and human (red) carbon cycles from data in Figure 2. Numbers in boxes show the carbon levels in GtC. Numbers by arrows show carbon flows in GtC per year.

IPCC's human carbon flowing into the atmosphere is 7.8 GtC per year plus about 1.1 GtC per year due to IPCC's (2013) estimate of human-caused land

changes, for a total human-caused carbon inflow of 8.9 GtC per year, which is about 4 ppm per year of CO_2.

Compare this to the natural carbon cycle where total inflow into the atmosphere (Figure 3) is 108 GtC from land plus 60.4 GtC from surface ocean, or 168 GtC per year, which is about 80 ppm per year. Therefore, IPCC's (2016) data show human CO_2 inflow is about 5% of total CO_2 inflow. We use this information later.

IPCC's and the Plaintiffs' problem is that we cannot measure the human CO_2 in the atmosphere separate from natural CO_2 because human and natural carbon-12 and CO_2 molecules are identical. So, Plaintiffs and IPCC have no data to show their H1 is true. That's why H1 is an unproven hypothesis.

G. CO_2 flows through the air as water flows through a lake.

It is important to understand how CO_2 flows through the carbon cycle. An analogy is how water flows into a lake and out over a dam.

Figure 4 illustrates how CO_2 flows through the atmosphere as water flows through a lake. The level seeks equilibrium. The faster the inflow, the higher the level. The higher the level, the faster the outflow. The level will rise or fall until outflow equals inflow.

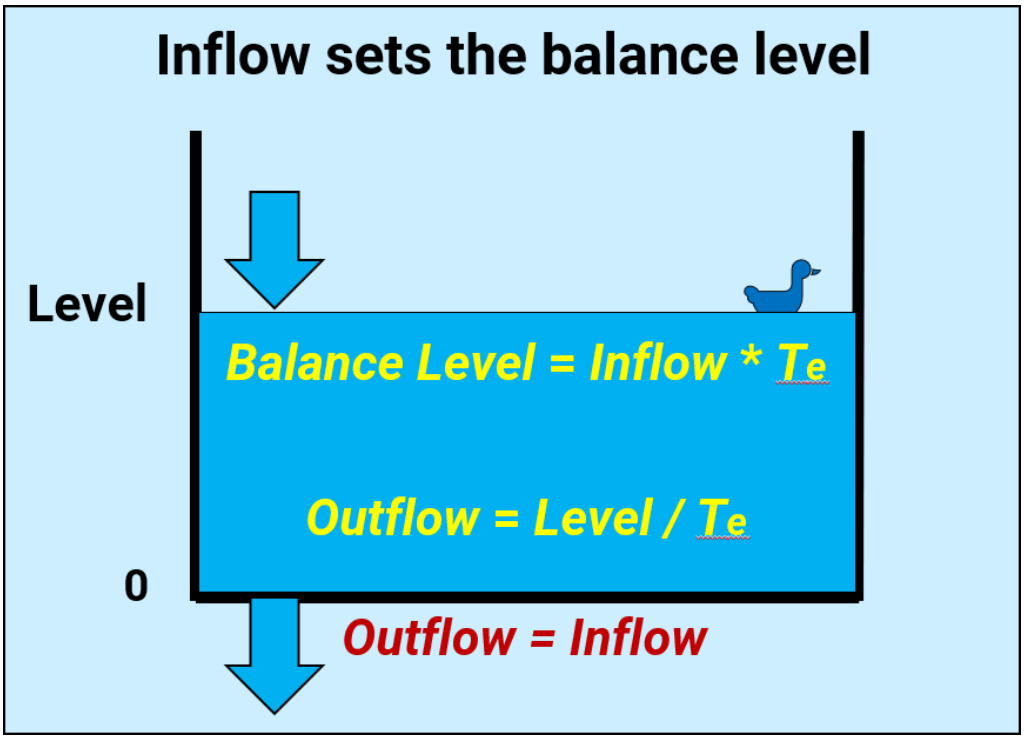

Figure 4. How CO_2 flows through the atmosphere. The level always moves to its balance level.

It is important to assign a term to define "how long CO2 stays in the atmosphere.

IPCC (2007, p. 948) defines "turnover time," Te as,

> "Turnover time (Te) is the Level or mass in a reservoir divided by the Outflow of the mass from the reservoir: (Te) = Level/Outflow."

In simple math, IPCC's definition of Te defines the outflow,

$$\text{Outflow} = \text{Level} / \text{Te} \qquad (1)$$

where Te is a time that describes how fast the level approaches its balance level.

The balance level is a level, set by inflow, where outflow equals inflow. When the level is at its balance level, we can substitute Inflow for Outflow and Balance Level for Level in (1) to get,

Inflow = Balance Level / Te (2)

Solving (2) for balance level, we get

Balance Level = Inflow * Te (3)

Equation (3) shows that inflow sets the balance level. When outflow equals inflow, no water "accumulates" in the lake, or CO_2 in the atmosphere. Equations (1), (2), and (3) are necessary to explain how natural CO_2 could have stayed at 280 ppm, as IPCC and Plaintiffs claim (H1).

IPCC (2007, p. 948) says the "turnover time" Te for natural CO_2 is only four years,

> "Carbon dioxide (CO_2) is an extreme example. Its turnover time is only about four years..."

IPCC's data in Figure 2 show natural Te is 3.5 years, or about 4 years.

The Te for human and natural CO_2 are identical because their carbon-12 atoms and CO_2 molecules are identical. The *Climate Equivalence Principle* and (1) make human and natural carbon cycles independent. Simply write (1) for human and for natural

flows and add the up to get the total outflows and total levels. We can add them up because human and natural Te are identical according to the *Climate Equivalence Principle*. IPCC agrees because its Figure 2 shows the human and carbon cycles are independent.

H. Human 5% inflow causes 5% of the total level.

According to (3), if the human inflow is 5% of the total inflow, the human balance level is 5% of the total balance level.

Figure 5 shows the natural balance level of 280 ppm is now 95% and the human balance level is 5% of the total level. The human 5% is only 14 ppm, making the total level equal to 294 ppm.

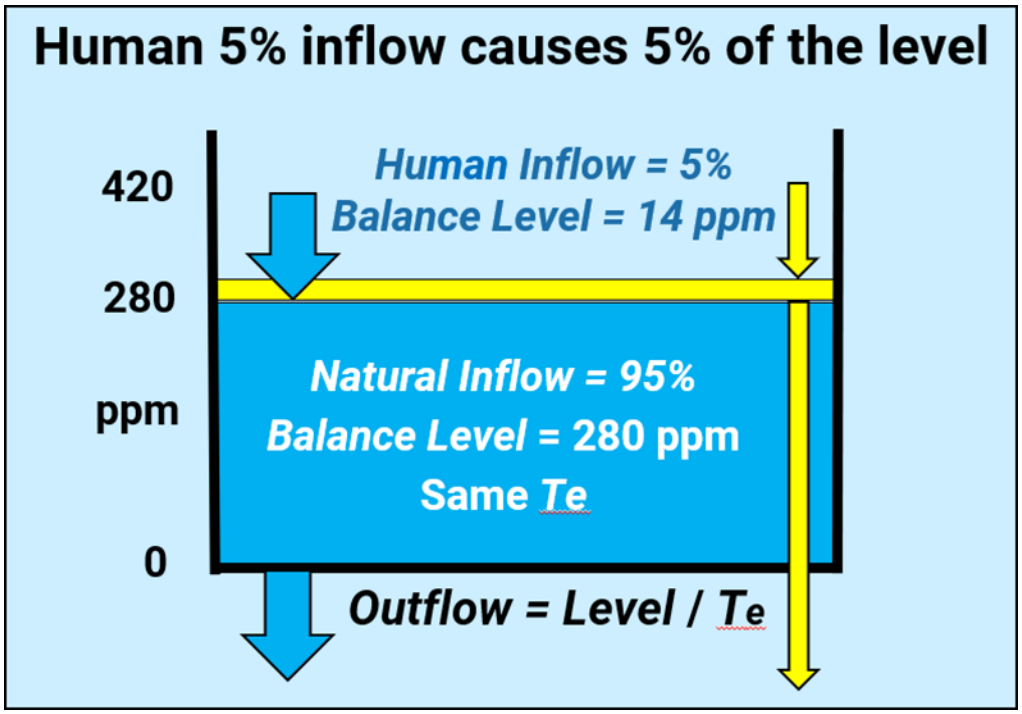

Figure 5. The 5% human balance level is 14 ppm.

I. Human 5% inflow cannot cause 33% of the total level

Hypotheses H1 says human carbon causes all the CO_2 increase, which would make human CO_2 33% of atmospheric CO_2.

Figure 6 shows the only way that could happen is for human Te to be 35 years rather than 3.5 years, or ten times the Te for natural CO_2. This would contradict the *Climate Equivalence Principle*. Plaintiffs need a fictitious "magic demon" in the atmosphere that separates human CO_2 from natural CO_2 and delays human CO_2 in the atmosphere while letting natural CO_2 flow freely out of the atmosphere.

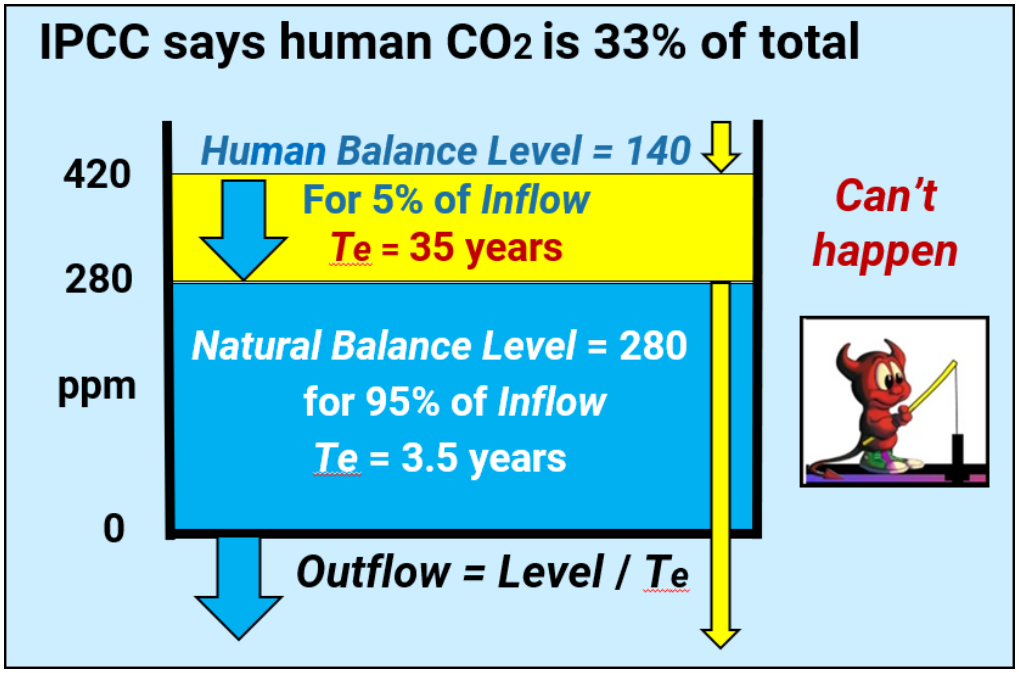

Figure 6. H1 says the human 5% inflow is 33% of the total level.

IPCC needed to claim the Te human CO_2 is a greater than Te for natural CO_2 to explain how 5% human inflow can become 33% of the total level as illustrated on Figure 6.

IPCC (2013, p. 469) simply says,

> "The removal of human-emitted CO_2 from the atmosphere by natural processes will take a few hundred thousand years (high confidence)."

Similarly, Plaintiffs – Section D, 71(H1) and 2 (H1) – say the removal time for human CO_2 is hundreds to thousands of years. This claim by the IPCC and Plaintiffs conflicts with IPCC's Te for natural CO_2 and the *Climate Equivalence Principle*, so this claim and H1 are false.

J. Natural CO_2 inflow must increase to cause 420 ppm

Figure 7 shows the only way the atmospheric CO_2 level can be 420 ppm, given that human CO2 inflow is about 5% of the total inflow, is for natural CO_2 inflow to increase its level from 280 ppm to 400 ppm.

Note this natural CO_2 level of 400 ppm makes it impossible for the Plaintiffs to achieve their 350-ppm goal by reducing human emissions.

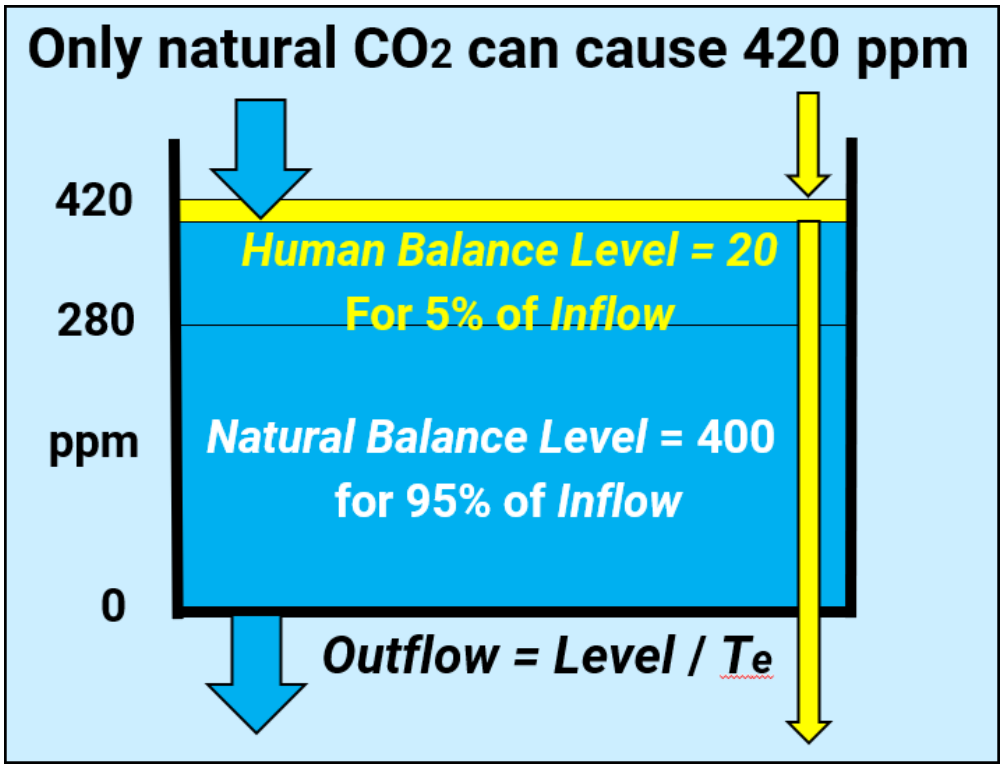

Figure 7. Only natural CO_2 can increase the CO_2 level to 420 ppm.

K. Human CO_2 is not a climate emergency

Figure 8 shows IPCC's percentages of carbon in each reservoir at equilibrium. The natural carbon cycle is on the top (in blue boxes) and the human carbon cycle is on the bottom (in red boxes).

IPCC's natural carbon cycle has 1.4% of its carbon in the atmosphere at equilibrium. Therefore, the human carbon cycle will also have 1.4% of its carbon in the atmosphere at equilibrium, according to the *Climate Equivalence Principle*.

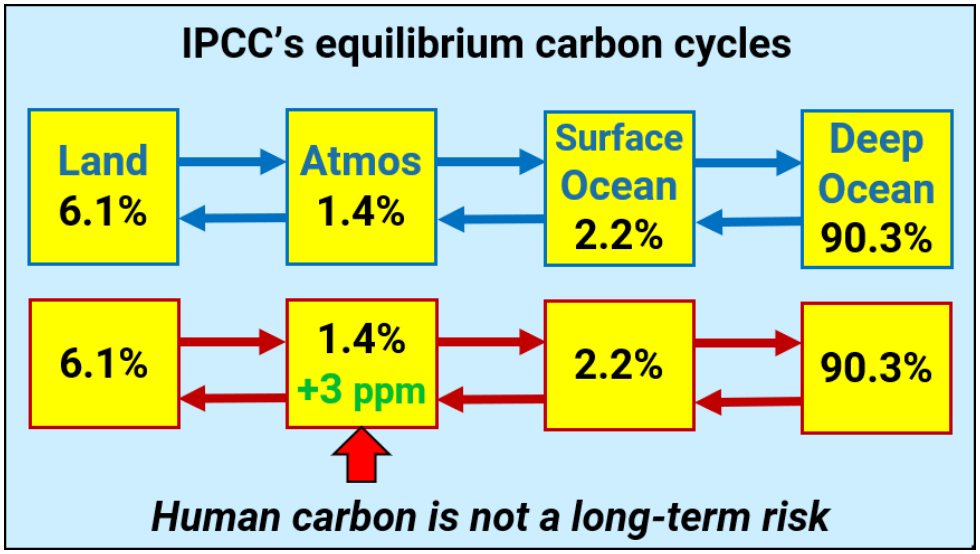

Figure 8. Natural (top) and human (bottom) carbon cycles at their equilibrium percentages.

Total human carbon in the human carbon cycle as of 2020 is about 450 GtC, or 213 ppm if it had all stayed in the atmosphere. At equilibrium, only 1.4%, or 3 ppm of human carbon would remain in the atmosphere. This shows human emissions are not an emergency.

Figure 9 shows approximate carbon inflows from human breathing and animal and fungal sources that the IPCC does not include in its carbon cycle. Estimated human breathing by 8 billion people causes more CO_2 inflow than human carbon burning.

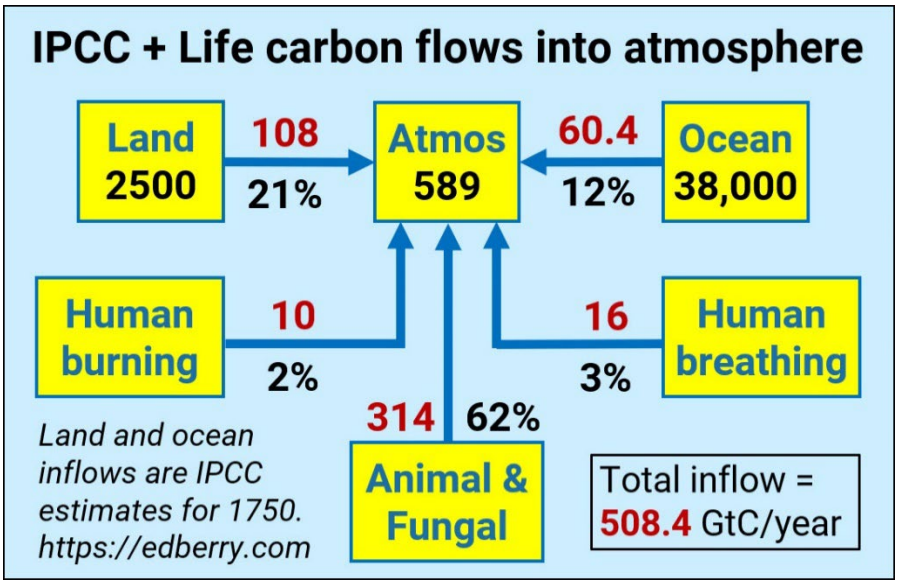

Figure 9. Estimated human breathing and animal carbon inflows.

Estimated carbon inflow from animal breathing and fungal matter cause more CO_2 inflow than IPCC's natural inflows from land and ocean. Since, from (3), inflows produce balance levels proportional to their inflows, to the first approximation, human carbon (10 GtC per year) has caused about 2%, and nature about 98% of today's 420 ppm.

L. Berry: IPCC's true human carbon cycle proves H1 is false

Figure 10 shows how Berry's (2021) carbon cycle model replicated IPCC's natural carbon cycle to prove his model is accurate. Then his model calculated IPCC's true human carbon cycle using IPCC's data for human CO_2 emissions. The difference proves IPCC's H1 is false.

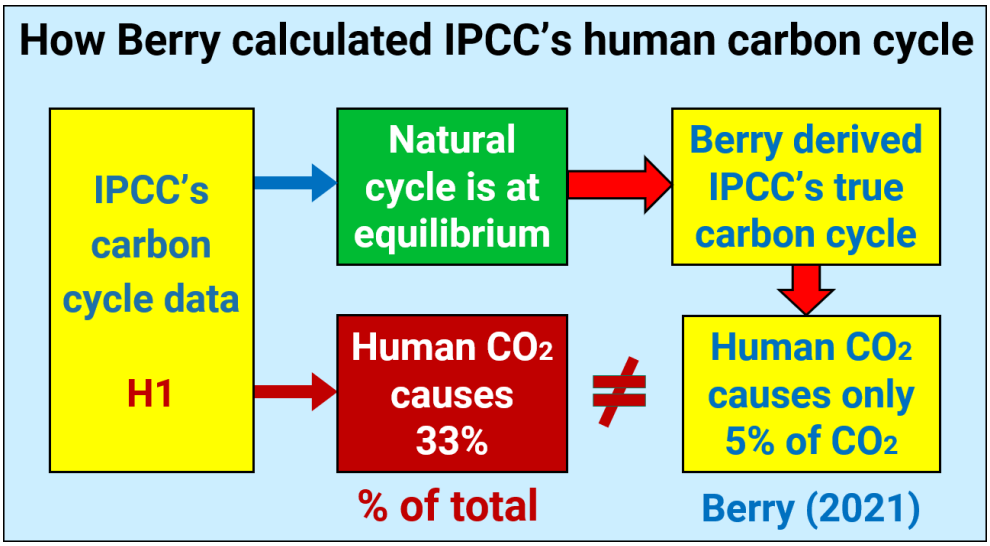

Figure 10. Shows how Berry proved IPCC's H1 is false.

Figure 11 shows carbon levels above 280 ppm. The sum of annual human carbon inflow (red dotted line to 213 ppm) crosses the measured total carbon level (black line to 137 ppm).

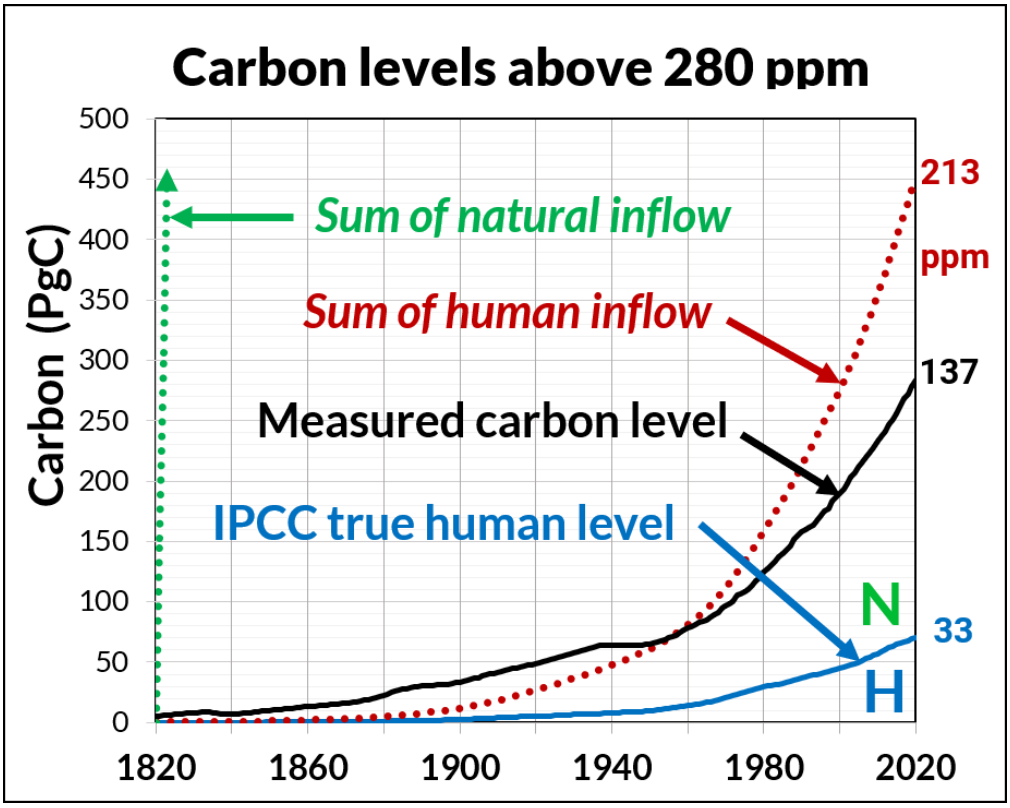

Figure 11. IPCC's data prove H1 is false.

Before 1950, sum of human inflow (red) was less than the measured carbon level (black), showing it is impossible for human CO_2 inflow to have caused the measured carbon level.

The blue line to 33 ppm shows IPCC's true human carbon cycle from Figure 10, calculated by Berry (2021), which proves H1 is false.

M. Berry: Carbon-14 data prove human CO_2 is insignificant

Figure 12 plots D14C from 1955 to 2015. D14C measures the amount of carbon-14 in a sample of carbon-12.

Notice: the definition of D14 subtracts 1000 from its base data to make the natural D14C balance level equal to zero. So, mentally add 1000 to the vertical scale to measure carbon-14 content.

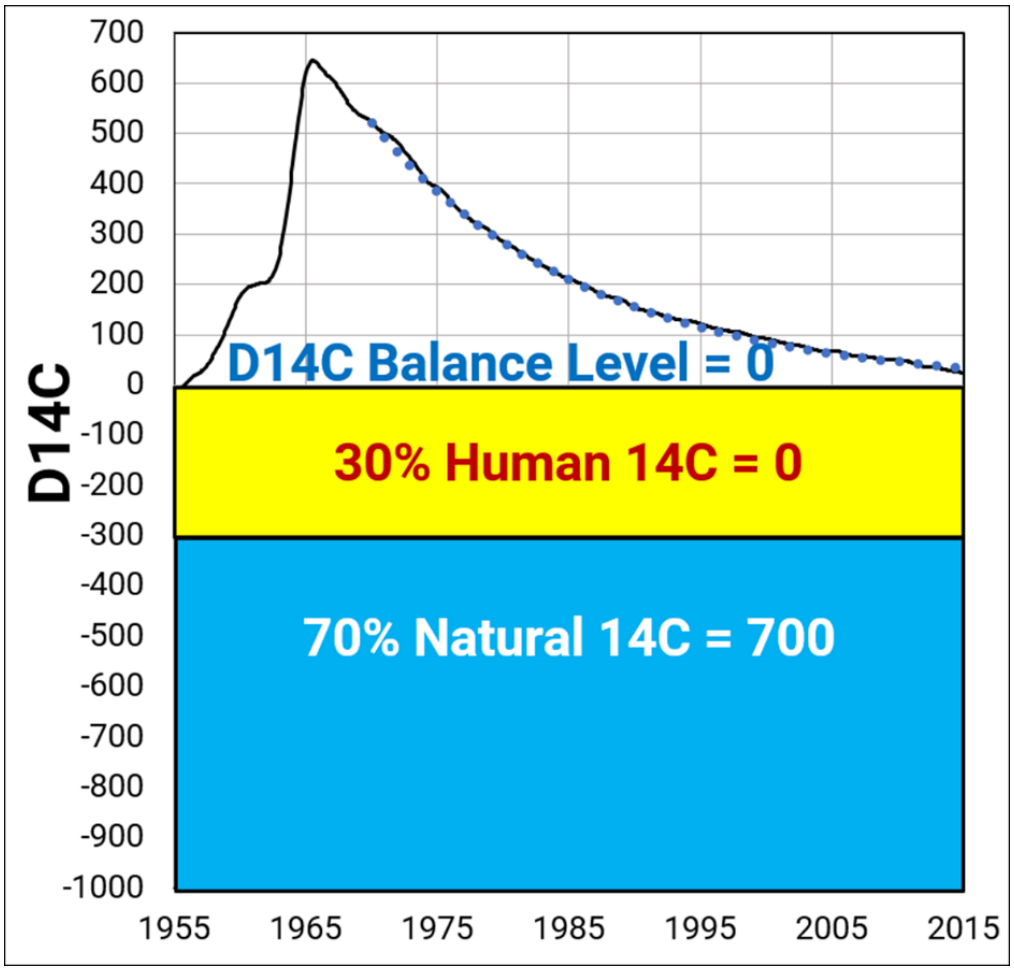

Figure 12. D14C from 1955 to 2015. Mentally add 1000 to the D14C vertical scale to measure carbon-14 content (Berry, 2023).

The upper curve in Figure 12 is the D14C level. The bomb tests increased carbon-14 after 1955. After the bomb tests stopped, D14C gradually decreased toward its balance level of zero. The blue dots show a mathematical curve fit to the D14C data after 1970. The fit uses Te = 16.5 years and balance level = zero. This fit shows the D14C balance level remained at zero.

You may think of carbon-14 as grape juice in water. Imagine adding grape juice to an empty glass until it is 70% full. Now add water to the remaining 30%. The water dilutes your 70% grape juice. Similarly, human CO_2 has no carbon-14, so it dilutes D14C.

Figure 12 shows what would happen to the D14C balance level IF human CO_2 were 30% of atmospheric CO_2. It would reduce the D14C balance level from zero to -300. But the D14C balance level remained near zero, proving human CO_2 is not a significant part of the CO_2 in the atmosphere. H1 is false.

N. Hayden: Plaintiffs' radiation calculations are invalid.

Physicist Howard Hayden (2022, 2023a, 2023b) shows Plaintiffs' and IPCC's temperature calculations make an error that overstates the warming effect of CO_2. Hayden provided most of the following dialog.

In 1896, Swedish scientist and Nobel Prize winner (for studying the conductivity of electrolytes) Svante Arrhenius (1896) calculated that doubling the level of CO_2 in the atmosphere would raise the global mean surface temperature by 5-6ºC. See Plaintiffs Section D:74.

IPCC (2021) has numerous references to Arrhenius (1896) but none — repeat, **none** — to Arrhenius (1906) that corrected his 1896 estimates to conclude doubling CO_2 "would cause a temperature change of + 1.6 degrees C."

1. Modern calculations of the greenhouse effect.

The Stefan-Boltzmann (SB) law links the Earth's surface temperature to its surface radiation *I*,

$$I\ (\mathrm{W/m^2}) = 5.67\ (\mathrm{K}/100)^4 \qquad (7)$$

where K is the absolute temperature. Table 1 shows calculations of (7) in our temperature range.

Table 1. Temperature vs Radiation for Stefan-Boltzmann Law.

Temperture			W/m2		
K	C	F	W/m2	Change / K	Change Total
287	14	57.2	384.7	0	0
288	15	59.0	390.1	5.4	5.4
289	16	60.8	395.5	5.4	10.8
290	17	62.6	401.0	5.5	16.3
291	18	64.4	406.6	5.6	21.9
292	19	66.2	412.2	5.6	27.5
293	20	68.0	417.9	5.7	33.2
294	21	69.8	423.6	5.7	38.9
295	22	71.6	429.4	5.8	44.7
296	23	73.4	435.3	5.9	50.6

2. Here's the problem.

IPCC (2021) calculates that doubling CO_2 would increase the greenhouse effect by 3.7 W/m^2 and this will increase surface temperature 3.0ºK, or twice that calculated by Arrhenius (1906). But Table 1 shows a 3.0ºK temperature rise, from 287ºK to 290ºK, would increase radiation by 16.3 W/m^2, not 3.7 W/m^2.

Table 1 also shows a 1.0ºK temperature rise, from 287ºK to 288ºK, would increase radiation by 5.4 W/m^3. This means a 3.7 W/m^2 radiation increase corresponds to a temperature increase of **0.67ºK** (= 3.7 W/m^2 divided by 5.4 W/m^2 per ºK).

A 0.67ºK temperature increase is much smaller than the 3.0ºK temperature increase that the IPCC and Plaintiffs claim. So, Plaintiffs' and IPCC's global warming is overstated and contradicts physics.

3. Plaintiffs ignore the Stefan-Boltzmann law.

The Stefan-Boltzmann law is taught in elementary college physics — calculus and non-calculus versions — elementary non-calculus astronomy, and in thermodynamics classes in chemistry, physics, and all branches of engineering. It is the principle on which now-ubiquitous infrared thermometers work. However, IPCC's very first mention of Stefan-Boltzmann in 31 years occurs in IPCC (2021) where the Stefan-Boltzmann constant is mentioned but not given.

O. Wiese proves H2 is false.

Occam's razor says the simplest explanation prevails over more complex explanations. This simple explanation explains the measured temperature increase more simply than IPCC's invalid H1 and H2. Meteorologist Chuck Wiese (2023) shows how the change in the Earth's albedo from 1984 to 2023 can explain the measured global warming. Albedo is the percent of incoming solar radiation that the Earth reflects before it can warm the Earth. Decreased cloud cover or aerosols decrease the Earth's albedo, which lets in more solar radiation that heats the Earth.

NASA satellite data show the Earth's albedo decreased by 1.3% from 1984 to 2023. This albedo decrease added 1.3% of the incoming 340 W/m^2 or 4.42 W/m^2 (on average) to the solar energy that heats the Earth's surface. Table 1 (in Section P) shows a temperature increase of 0.81ºC would balance the added heat inflow of

4.42 W/m^2. This is very close to the measured increase in land temperature of 0.76^{o}C since 1984.

P. Humlum et al. prove H1 and H2 are false.

Cause precedes effect Humlum et al. (2012) performed a major study of temperature and CO_2 changes since 1980. They conclude:

(1) The overall global temperature change appears to be from 1) the ocean surface to 2) the land surface to 3) the lower troposphere.

(2) Changes in global atmospheric CO_2 **lag** about 11–12 months behind changes in global **sea** surface temperature; 9.5–10 months behind changes in global **air** surface temperature; and 9 months behind changes in global lower troposphere temperature.

(3) Changes in ocean temperatures explain a substantial part of the observed changes in atmospheric CO_2 since January 1980.

(4) CO_2 released from anthropogenic sources has little influence on the observed changes in atmospheric CO_2.

(5) Since at least 1980, changes in global temperature represent a major control on changes in atmospheric CO_2.

Q. Koutsoyiannis et al. prove H1 and H2 are false.

Koutsoyiannis et al. (2023) certify the conclusion of Humlum et al (2012). Koutsoyiannis et al. use a new statistical method that separates cause and effect and proves temperature changes precede CO_2 changes. Figure 13 (Koutsoyiannis'

Figure 2) shows changes in the logarithm of CO_2 **follow** temperature changes with a dominant delay from 2 to 15 months, essentially the same delays found by Humlum et al (2012).

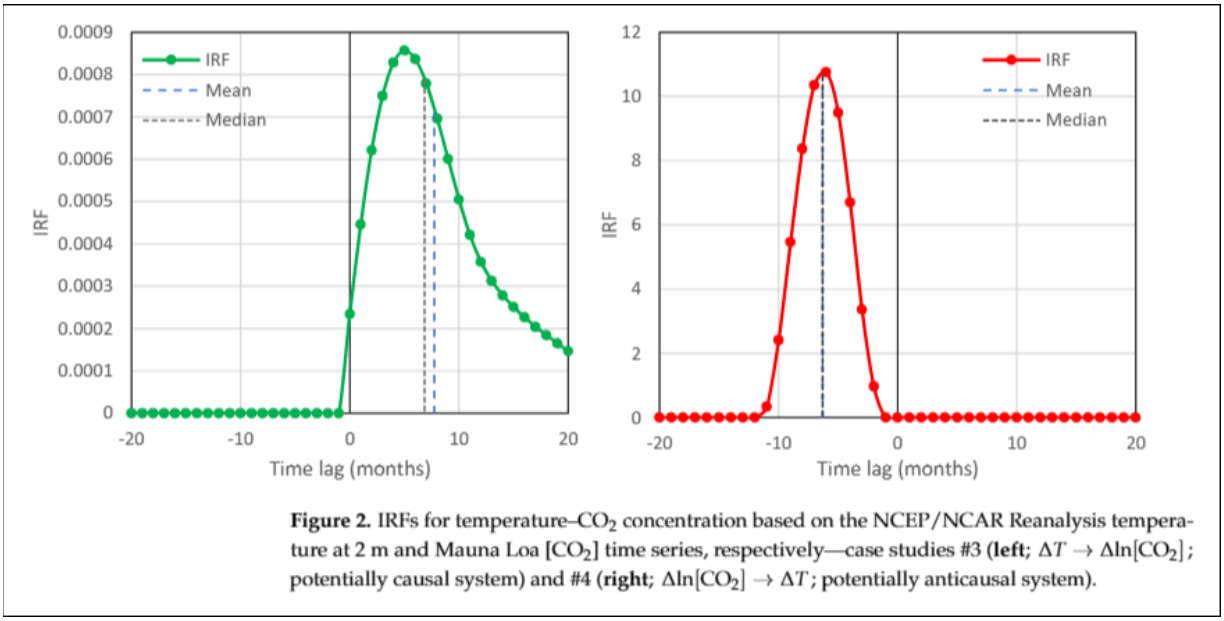

Figure 2. IRFs for temperature–CO_2 concentration based on the NCEP/NCAR Reanalysis temperature at 2 m and Mauna Loa [CO_2] time series, respectively—case studies #3 (**left**; $\Delta T \rightarrow \Delta \ln[CO_2]$; potentially causal system) and #4 (**right**; $\Delta \ln[CO_2] \rightarrow \Delta T$; potentially anticausal system).

Figure 13. Temperature changes lead CO_2 changes.

Koutsoyiannis et al. show global temperature changes **lead** changes in the logarithm of CO_2 by 2 to 15 months (green), and that changes in the logarithm of CO_2 **do not lead** changes in temperature (red). This proves H2 is false, and also H1 is false because temperature does not drive human CO_2 emissions.

R. Miskolczi proves H2 is false.

Ferenc Miskolczi (2023) works at the frontier of theoretical climate physics. He looks at the big picture of how the atmosphere maintains the Earth's surface temperature. He shows the long-time average of the observed all-sky Earth-

atmosphere system is in radiative equilibrium with the Sun, and the Plaintiffs' claimed Earth energy imbalance (EEI) of ~0.6 W/m^2 does not exist.

He shows global mean cloud cover fully explains changes in the observed global mean surface temperature, and the Plaintiffs' claimed Arrhenius CO_2 greenhouse effect is impossible. He shows theoretical surface temperatures are independent of non-condensing GHGs, like CO_2. This does not mean these GHG's have no instantaneous effect on temperature. Rather, this means the rest of the atmosphere system modifies their overall effect on temperature.

Miskolczi shows the Earth's hydrological cycle adjusts cloud cover, precipitation, surface temperature, and water vapor to maintain radiative equilibrium with the sun. This natural adjustment negates the warming effect of non-condensing GHGs, like CO_2 and CH4.

His theoretical formula for surface temperatures depends only on intercepted available solar radiation and cloud-top emission. His equations accurately reproduce the observed surface temperature of 12.91°C without any involvement of the non-condensing GHGs.

Miskolczi shows IPCC's assumption of positive water vapor feedback is unphysical and leads to an unphysical runaway greenhouse effect.

Finally, he shows the errors in IPCC's surface temperature estimates make GCMs useless for climate change predictions.

CONCLUSIONS

All Plaintiffs' damage claims assume H1 and H2 are true. The amicus parties used IPCC data and IPCC-approved data to provide multiple proofs that H1 and H2 are false. Table 2 below shows the paragraphs and hypotheses proved false by Sections F through N above.

	District Court Paragraphs						**Plaintiffs' claims**					
	H1	**H2**	**H2**	**H2**	**H2**	**H1**	**H1**			**H2**		
	71	**78**	**82**	**85**	**87**	**87**	**1**	**2**	**3**	**4**	**5**	**6**
F	x					x	x	x				
G	x					x	x	x				
H	x					x	x	x				
I	x					x	x	x				
J	x					x	x	x				
K	x					x	x	x				
L	x					x	x	x	x			
M		X	x	x						x	x	x
N		X	x	x						x	x	x
O		X	x	x						x	x	x
O		X	x	x	x					x	x	x
Q		X	x	x	x					x	x	x

Courts are ill equipped to function as scientific institutions or to weigh the costs and benefits of sweeping policy decisions and value judgments that will have

impacts on all citizens of Montana. The electorate and its direct representatives in the Legislator are properly charged with this function. Accordingly, the trial court's decision should be reversed.

DATED this 13th day of February 2024.

Respectfully submitted,
RHOADES & ERICKSON PLLC

By: /s/ Quentin M. Rhoades
Quentin M. Rhoades
Attorneys for Friend of the Court

CERTIFICATE OF COMPLIANCE

Pursuant to Mont. R. App. P. 11(4), I certify that Amicus Curiae Brief in Support of Appellants is printed with proportionated spaced Equity text typeface of 14 point and double-spaced, except for footnotes and for quoted and indented material; and the word count calculated by Microsoft Word is less than 5,000 words, excluding those sections named in Mont. R. App. P. 11(4)(d).

/s/Quentin M. Rhoades
Quentin M. Rhoades