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## The Hair of the Dog and the Eye of the Needle: On Materialism and Climate Change

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A verage global temperatures have been increasing at a predictable rate of 0.1°C for every 10 parts-per-million increase in atmospheric carbon dioxide concentrations since the human inhabitants of this planet began burning significant amounts of fossil fuel in the mid-nineteenth century. As early as 1938, when amateur climatologist and (ironically) professional steam engineer, Guy Stewart Callendar published research demonstrating an empirical link between rising global temperatures and atmospheric carbon dioxide concentrations,

There are certainly no shortage of ideas about how to address and mitigate the problems of climate change, especially on the level of societal and governmental action. But does not the problem go deeper than this, into the transformation of the human heart? Many of the proposed solutions to this problem seem, in fact, to fail to take this matter into consideration. humankind has been challenged to find an appropriate response to this phenomenon.

Perhaps unsurprisingly, our reactions have followed the same pattern of responses described by Elizabeth Kübler-Ross in her pathbreaking work on how the dying react to the existential threat of their own impending deaths. Initial responses to Callendar's research were marked either by denial of the link between global temperature increases and carbon dioxide concentrations, or by skepticism at the seriousness of the threat such a link would pose if it indeed existed. Of the six discussants of Callendar's original paper, one questioned Callendar's bona fides; another argued for more research on the natural movements of carbon dioxide; two suggested that his data reflect merely a casual variation; and another congratulated Callendar on his courage, but questioned the basic premise that carbon dioxide concentrations were actually increasing. Only one discussant agreed that there had been significant global warming during the period studied by Callendar, but even he questioned the link to increased carbon dioxide emissions.<sup>1</sup>

For his part, Callendar himself appeared to be—at least at this point in his career—remarkably sanguine about the phenomenon he documented. He begins his paper with something approaching fear and awe at the fact that human activity is altering our planet's climate, writing that:

Few of those familiar with the natural heat exchanges of the atmosphere, which go into the making of our climates and weather, would be prepared to admit that the activities of man could have any influence upon phenomena of so vast a scale. In the following paper I hope to show that such influence is not only possible, but is actually occurring at the present time.<sup>2</sup>

Yet despite this rather terrifying introduction, Callendar concludes his paper by reassuring his readers that:

 <sup>&</sup>lt;sup>1</sup> G. S. Callendar, "The Artificial Production of Carbon Dioxide and Its Influence on Temperature," *Quarterly Journal of the Royal Meteorological Society* 64, no. 275 (1938): 223–240.
<sup>2</sup> Callendar, "The Artificial Production of Carbon Dioxide," 223.

The combustion of fossil fuel...is likely to prove beneficial to mankind in several ways, besides the provision of heat and power. For instance, the above mentioned small increases of mean temperature would be important at the northern margin of cultivation... In any case the return of the deadly glaciers should be delayed indefinitely.<sup>3</sup>

Even as Callendar's work has proven itself prescient in establishing a link between carbon dioxide emissions and global warming, Callendar's own reaction to this linkage-that of rationalizing our new role as agents of planetary climate change with the recognition of the benefits we derive from the combustion of fossil fuels and the possible benefits that global warming itself might provide-anticipated our entry into a Kübler-Ross bargaining structure. While there are still those who remain skeptical of human-induced climate change, the majority of people across the globe appear convinced that burning fossil fuels has increased global temperature.<sup>4</sup> And while there is no published evidence that Callendar himself ever entered the Kübler-Ross anger phase, there is abundant evidence, documented in both the popular press and in academic journals, that global climate change contributes to real anger directed at whatever set of nations, institutions, economic systems, faith commitments, and ideologies attract the ire of protestors, op-ed writers, public intellectuals, scholars, and even members of the Lutheran fellowship.5

> We have confronted global climate change with a battery of bargains, from the hair-of-the-dog response that encourages us to find a material response to a perceived material problem

Regardless of who or what we blame for global climate change, as a global community, we do not appear to be willing to do less, consume

<sup>&</sup>lt;sup>3</sup> Callendar, "The Artificial Production of Carbon Dioxide," 236.

<sup>&</sup>lt;sup>4</sup> *The Peoples' Climate Vote 2024* (New York: United Nations Development Programme, 2024), 66.

<sup>&</sup>lt;sup>5</sup> Contributing writers to *God*, *Creation*, *and Climate Change* view climate change as a result, *inter alia*, of patriarchy, colonization, Western thinking, and discrimination based on gender and race. See *God*, *Creation*, *and Climate Change* (Geneva: Department for Theology and Public Witness, The Lutheran World Federation, 2009).

less, or drive less. We have confronted global climate change with a battery of bargains, from the hair-of-the-dog response that encourages us to find a material response to a perceived material problem, to the eye-of-the-needle response that calculates whether expenditures for these material solutions are worth it.

These responses have not proven themselves effective at achieving reductions in green-house gas (GHG) emissions.<sup>6</sup> Global emissions of green-house gases in 2023 reached a record high of 37.4 billion gigatons, up by 1.3 percent over 2022.7 Meanwhile, international negotiations seeking to find a path forward have become ever more fractious and more polarizing, as the rifts between developed and lesser developed countries, between corporations that produce goods and the consumers to whom they sell their products, and between the rich and the poor, seem to grow wider with every meeting of the COP delegates.8 And lately, in addition to denial, anger, and bargaining, we are finding signs that some of us are entering the Kübler-Ross stage of depression. A recent Yale study found that three percent of American adults (nearly eight million individuals) "may be experiencing potentially serious levels of anxiety due to climate change."9 A 2021 article published in The Lancet Public Health reports that in a survey of 10,000 young people (ages sixteen to twenty-five) across ten countries (Australia, Brazil, Finland, France, India, Nigeria, Philippines,

<sup>6</sup> While early-twentieth-century research on the greenhouse effect focused exclusively on carbon dioxide emissions, later work added to the list of chemicals contributing to climate change. In addition to carbon dioxide, methane, nitrous oxide, and fluorinated gases are also classified as greenhouse gases (GHG). Emissions of these other pollutants are measured in units of "carbon dioxide equivalents," based on their global warming potential relative to the equivalent amount of damage a ton of carbon dioxide contributes to the atmosphere.

 $^7$  "CO<sub>2</sub> Emissions in 2023: A New Record High, but is there Light at the End of the Tunnel?," (International Energy Agency, 2024). https://www.iea.org/reports/co2-emissions-in-2023. A gigaton is equal to a billion metric tons. A metric ton is equal to 1,000 kilograms, or about 2,025 pounds. The weight of carbon dioxide emissions is calculated by first recognizing that, while carbon has an atomic weight of 12, oxygen has an atomic weight of 16. A molecule of carbon dioxide therefore has an atomic weight of 44 (12+32), which is 3.66667 times that of the weight of a carbon atom. A gallon of gasoline is roughly 87 percent carbon, and a gallon of gasoline weighs 6.3 pounds. Therefore, burning a gallon of gasoline will add roughly (0.87\*6.3\*3.6667) 20 pounds of carbon dioxide to the atmosphere.

<sup>8</sup> COP stands for Conference of Parties. A party is a signatory in the most recent climate change treaty.

<sup>9</sup> "The Prevalence of Climate Change Psychological Distress among American Adults," *Yale Program on Climate Change Communication* (blog). https://climatecommunication.yale. edu/publications/climate-change-psychological-distress-prevalence/. Portugal, the UK, and the USA), nearly half of the respondents reported that climate change negatively affected their daily life and functioning, while three-quarters of those surveyed said that climate change made them fearful for their future.<sup>10</sup>

It is tempting to give up and seek instead to reconcile ourselves to ever increasing, ever dire climate chaos. While my own *bona fides* as a practitioner of the dismal science discourage unbounded optimism, I argue that it is both our duty and our calling as stewards of this material planet, created and redeemed by a transcendent, immaterial God, to do better than that. Rather than throw up our hands in despair, we need to assess what seems to work, and what does not seem to work, as we search for a way to confront and live in this material, beloved world. How can we contribute to the good?

## The Hair of the Dog

Naaman, commander of the army of the king of Aram, was a great man and in high favor with his master because by him the Lord had given victory to Aram. The man, though a mighty warrior, suffered from a skin disease....So Naaman came with his horses and chariots and halted at the entrance of Elisha's house. Elisha sent a messenger to him, saying, "Go, wash in the Jordan seven times, and your flesh shall be restored, and you shall be clean." But Naaman became angry and went away, saying, "I thought that for me he would surely come out and stand and call on the name of the Lord his God and would wave his hand over the spot and cure the skin disease! Are not Abana and Pharpar, the rivers of Damascus, better than all the waters of Israel? Could I not wash in them and be clean?" He turned and went away in a rage. But his servants approached and said to him, "Father, if the prophet had commanded you to do something difficult, would you not have done it? How much more, when all he said to you was, 'Wash, and be clean'?" So

<sup>&</sup>lt;sup>10</sup> Caroline Hickman et al., "Climate Anxiety in Children and Young People and Their Beliefs about Government Responses to Climate Change: A Global Survey," *The Lancet Planetary Health* 5, no. 12 (2021): 868.

he went down and immersed himself seven times in the Jordan, according to the word of the man of God; his flesh was restored like the flesh of a young boy, and he was clean. (Second Kings 5: 1, 9–14, NRSV)

The belief in the healing powers of dog hair goes back to Pliny the Elder, who writes in *Natural History* that: "When a person has been bitten by a mad dog, he may be preserved from hydrophobia by applying the ashes of a dog's head to the wound....Others insert in the wound ashes of hairs from the tail of the dog that inflicted the bite."<sup>11</sup>

As a metaphor for attempting to reduce the injuries inflicted by our consumption of material goods by consuming more material goods, the hair of the dog seems particularly apt. It appears equally apt as a metaphor for relying on market mechanisms to solve a problem created by our ever-expanding system of global markets. The question is, do we have a better chance fighting climate change with material goods and markets than the Romans fighting rabies with dog hair?

*Fighting Materialism with Materialism:* Can we buy our way to a better environment? It is, in some ways, an inconvenient truth that as concerns climate change, we have met the enemy, and he is us. As much as corporations are often cast as climate-change villains, the simple fact is that corporations do not emit carbon dioxide and other greenhouse gases for their own pleasure. Corporations and other producers emit GHGs as by-products of a process directed at producing goods and services for the pleasure of households, other businesses, non-profit organizations, and government. Of these distinct sectors, GHG emissions resulting from production of goods and services to meet household demand accounts for between 72 percent and 75 percent of total annual GHG emissions.<sup>12</sup>

Assessing the magnitude of GHG emissions produced to support household consumption requires that researchers use a consumption-based accounting framework which differs significantly from the production-based framework utilized by governments and in international climate negotiations. A production-based framework

<sup>&</sup>lt;sup>11</sup> "Pliny the Elder, *Naturalis Historia*, 24.32.

<sup>&</sup>lt;sup>12</sup> Edgar G. Hertwich and Glen P. Peters, "Carbon Footprint of Nations: A Global, Trade-Linked Analysis," *Environmental Science & Technology* 43, no. 16 (2009): 6414–6420; Angela Druckman, Tim Jackson, "Understanding Households as Drivers of Carbon Emissions," in *Taking Stock of Industrial Ecology* (New York: Springer Publishing House, 2016).

accounts for emissions from the perspective of the country in which a good is produced. A consumption-based perspective assigns emissions to the country in which a good is consumed. Under a production-based framework, emissions released during the manufacture of a good in China count as part of China's carbon emissions. Under a consumption-based accounting framework, if a good produced in China is in turn exported to the United States for consumption there, the emissions associated with its production count towards US emissions. Using the consumption-based accounting framework, nearly 30 percent of the emissions released to meet US household demand for goods and services originate outside of the US.<sup>13</sup>

Every person reading this article is a member of the economic entity classified as households. The inconvenient truth that *household* demand for goods and services (and not some corporate villains') drives GHG emissions, is actually *empowering*. If we, as households comprised of private individuals, are responsible for the majority of carbon emissions, we, as households, are empowered to do something about it. We don't have to depend on firms and corporations to come up with new production processes, nor do we have to insist that producers accept lower profits, nor do we have to insist that they offer lower returns on investments. Going after suppliers and their production processes will not come close to meeting the challenge before us. Clearly, if we are to reduce GHG, we need to focus our efforts, quite literally, on the home front.

Households' significant responsibility for global carbon emissions—particularly among households in developed, high-income countries—clearly points to the salutary effects simply reducing household consumption could have on climate health. But households in high-income, developed countries have been reticent to take this course of action. Perhaps, like Naaman, we are hoping for something a bit more dramatic than simply cutting back. Economists have long argued for a global tax on GHG emissions would force us to consider the costs that emissions impose on the world and its current and future inhabitants. Importantly, the tax would raise the cost of carbon-intensive production processes and carbon-intensive

<sup>&</sup>lt;sup>13</sup> Christopher L. Weber and H. Scott Matthews, "Quantifying the Global and Distributional Aspects of American Household Carbon Footprint," *Ecological Economics* 66, no. 2 (2008): 379–391.

consumption patterns, making both less desirable than available alternatives. While carbon taxes have been imposed at the national level in twelve countries, there is little evidence of international support for such a measure.<sup>14</sup>

Meanwhile, there are a few "hair-of-the-dog" options out there that hold the promise of providing significant reductions in household carbon emissions while offering households the same level of material satisfaction. Such hair-of-the-dog options include switching from fossil-fuel based to renewable forms of energy for household use, either through purchasing renewably-sourced power from a public utility or producing it via on-site solar panels or windmills; switching from gasoline-powered to battery-powered electric vehicles; and switching to a vegan diet.<sup>15</sup> Taken together, such substitutes could allow the average American to reduce individual GHG emissions by about one-fourth.<sup>16</sup>

Carbon Compliance and Offset Markets—Can we use markets to solve a market-induced problem? Both carbon credits and carbon offsets are sold in markets characterized by trades between those who supply GHG reductions, measured in tons of carbon dioxide equivalents either removed from the atmosphere or removed from an anticipated or actual emissions load, and those willing to pay for these reductions. Standard forces of supply and demand determine the market price of these credits and offsets, with increases in demand for emissions reductions resulting in increased prices for credits and offsets, and increases in supply of emissions reductions resulting in decreased trading prices.

Carbon credit markets are created by political entities such as states, national, and international governmental bodies (e.g., the EU) through the enactment of enforceable cap-and-trade programs

<sup>14</sup> Carbon taxes have been imposed at the national level in Argentina, Chile, Columbia, Estonia, Japan, Latvia, Mexico, Poland, Singapore, South Africa, Ukraine, and the United Kingdom. They range from between one and forty dollars per ton of carbon dioxide emitted.

<sup>15</sup> The efficacy of switching to an electric vehicle depends entirely on the fuel mix used to generate the electricity that recharges the battery. If the electricity is generated by solar panels or wind, there are essentially no emissions associated with the use of an electric vehicle (EV). However, if the electricity is produced at a coal-fired plant, there may be no significant reductions in carbon dioxide emissions associated with the use of an EV. See Stephen P. Holland et al., "Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors," *American Economic Review* 106, no. 12 (2016): 3700–3729.

<sup>16</sup> Diana Ivanova et al., "Quantifying the Potential for Climate Change Mitigation of Consumption Options," *Environmental Research Letters* 15, no. 9 (2020).

setting limits on emissions. Under these programs, individual emitters who find that they are able to produce within the legally imposed cap on emissions are able to sell the unused portion of their emission allowances to companies which find themselves unable to meet the constraint.

Carbon credit markets create incentives for carbon-reducing technological innovation by giving firms a marketable asset (the credit) as a reward for emission reductions in excess of the cap. If the government lowers the cap in service to environmental goals, the value of these marketable credits increases. This means that firms within the industry who, having adopted technological processes that allow them to more-than-exceed industry emission standards, and who therefore hold excess credits, have an incentive to support ever-more-stringent regulations. The fact that in 2023 alone, Tesla generated \$1.79 billion in sales of its GHG credits to other automakers whose fleets failed to meet their emission obligations, is evidence of the potential gains to producers who adopt carbon-emission reducing technology.<sup>17</sup>

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Carbon offsets are entirely different goods. From an economic standpoint, the crucial difference between offsets and credits is that the market for offsets is created entirely by voluntary actions on both the part of those who demand and those who supply the offsets. Suppliers produce offsets by engaging in activities that, they argue, hold the promise either to remove carbon dioxide from the atmosphere, or to reduce permanently the amount of carbon dioxide human activities would have emitted, had the activity supported by the offset not been undertaken. Projects earning carbon offsets include reforestation, binding agreements to prevent deforestation, wetlands restoration,

<sup>&</sup>lt;sup>17</sup> Craig Trudell, "Tesla Rakes In Billions From Selling Regulatory Credits," *Transport Topics*, February 9, 2024, https://www.ttnews.com/articles/tesla-selling-regulatory-credits.

methane capture, the distribution of energy efficient cookstoves, and renewable energy developments.<sup>18</sup>

At its most benign level, the carbon offset market brings together individuals who want to supply a good thing with individuals who want to do a good thing. At a slightly less benign level, the carbon offset market brings together individuals who want to signal a desire to supply the right thing, with individuals who want to give themselves assurances that they are doing the right thing to compensate for a lifestyle choice, like taking a trip on a jet airplane. The major criticism of these programs, however, is captured in the term "additionality." No one really knows if the stoves, or the windmills, or the dam that is credited with offsetting carbon emissions will in any way reduce carbon emissions relative to what emissions would have been in the absence of these particular stoves, windmills and dams. How do we know that the dam would not have been built, or the windmills not installed? The carbon offset market does seem to ring of the pre-Reformation, church-based practice of indulgences.<sup>19</sup> Money transferred; outcome uncertain.

Critically, however, since the COP29 conference in November 2024, these uncertain-outcome carbon-offset markets are now allowed by the United Nations to meet national, treaty-based commitments to reductions in global carbon emissions. Countries can now purchase these offsets, and claim with trumpets and drums that they have met their United Nations climate change emissions targets.<sup>20</sup> Unlike carbon *credits*, as most climate *offsets* do not reduce real emissions, but rather reduce anticipated future emissions, and insofar as anticipated future emissions include those anticipated if a *particular* forest were not cut, or if a *particular* wind farm were not built, or if a *particular* lar tree plantation was not planted, carbon offsets fail to provide, to individuals and now to nation-states, a *certain* reduction in the carbon dioxide concentration in our atmosphere. To the extent that they

<sup>&</sup>lt;sup>18</sup> "United Nations Online Platform for Voluntary Cancellation of Certified Emission Reductions (CERs)," *United Nations Carbon Offset Platform*, 2025. https://offset.climateneutralnow.org/.

<sup>&</sup>lt;sup>19</sup> "Carbon Credits—the Indulgence Trade of the 21st Century," *Rainforest Rescue*, https://www.rainforest-rescue.org/topics/carboncredits.

<sup>&</sup>lt;sup>20</sup> "World Approves UN Rules for Carbon Trading between Nations at COP29," *France* 24, November 23, 2024, https://www.france24.com/en/live-news /20241123-world-approves-un-rules-for-carbon-trading-between-nations-at-cop29.

become a way for developed, high-income countries to avoid reducing their own emissions, carbon offsets might increase atmospheric carbon dioxide concentrations.

If we are hoping to effect reductions in actual emissions, capand-trade programs do offer a way to spur investment in technology that will contribute to that goal. On the other hand, while carbon offset programs are likely to contribute to "greener" development paths in some countries than would be expected under the status quo, their overall effect on atmospheric concentrations of GHG is uncertain and potentially deleterious.

The story of Naaman tells us that sometimes, the simple solution is the best one. We can lower emissions by our own actions. We can choose to buy second-hand goods (satisfying household demand at zero (!) additional emissions). We can choose to wear an extra sweater and go meatless a few days a week. We can see if our public utility offers us a choice to switch to an all-renewable energy source, and we can decide if the utility's possible surcharge is affordable. Like washing in the Jordan, these are not difficult tasks. And they are all within our power to do.

## The Eye of the Needle—A Framing Question

Jesus answered, "If you want to be perfect, go, sell your possessions and give to the poor, and you will have treasure in heaven. Then come, follow me." When the young man heard this, he went away sad, because he had great wealth. (Matthew 19: 21–24 NRSV)

The sad young man who, burdened by his own wealth, left Jesus's presence was no doubt engaged in his own form of benefit-cost analysis. "Is it worth it?" he asks himself. Economists have asked themselves the same question regarding sacrificing today to avoid future increases in global temperatures. Is it worth it?

William Nordhaus, whose work integrating climate change into long-run macroeconomic analysis earned him the 2018 Nobel prize in economics, famously argued *against* significant US investment in efforts to constrain global temperature increases to less than 2.5° C. While global warming was predicted to cause extreme and catastrophic events with annual costs to the US economy estimated at \$25 billion, and losses due to changes in sea level, human health, and human settlements of another \$20 billion annually, the increased *recreational benefit* of having warmer summers and shorter winters, estimated at \$17 billion per year, reduced the net costs imposed on the US economy by a 2.5°C increase in temperature to a mere fraction of a single percent of the US gross national product.<sup>21</sup> More days at the golf course trumped losses to human health and security. While Nordhaus has recently revised his estimates, and now concludes that a 2.0°C increase in temperature will result in a 4.4 percent reduction in global output by 2100, therefore meriting abatement expenditures of as much as \$66 per ton of carbon dioxide removed from our emissions, the sterile calculations, the facile trade-offs, and the detached conclusions of benefit-cost analysis are still chilling.<sup>22</sup>

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Nordhaus cannot be blamed for his answer to a problematically framed question. Since 1979, when the meteorologists attending the First World Climate Conference issued an appeal to the "nations of the world...to foresee and to prevent potential man-made changes in climate that might be adverse to the well-being of humanity," our reliance on the "nations of the world" to address climate change has framed what should be a moral and faith-based problem as a political problem.<sup>23</sup> Given the magnitude of the risks posed by an increase in atmospheric temperatures, and given the global scale of the potential problems associated with global climate change, framing the problem

<sup>&</sup>lt;sup>21</sup> William D. Nordhaus and Joseph Boyer, *Warming the World: Economic Models of Global Warming* (Cambridge: MIT Press, 2000), 97.

<sup>&</sup>lt;sup>22</sup> Lint Barrage and William Nordhaus, "Policies, Projections, and the Social Cost of Carbon: Results from the DICE-2023 Model," *Proceedings of the National Academy of Sciences* 121, no. 13 (2024).

<sup>&</sup>lt;sup>23</sup> Declaration of the World Climate Conference (World Meteorological Organization, 1979), https://dgvn.de/fileadmin/user\_upload/DOKUMENTE/WCC-3/Declaration\_WCC1.pdf.

as one requiring action at the level of "the nations of the world" is understandable. Nonetheless, this framing has proven problematic in several critical ways.

By framing climate change as a political problem, the solution to climate change became cast as one requiring negotiated commitments among countries with diverse national interests. The heated discussions that characterized the recent UN COP 29 meeting in Baku, Azerbaijan and, closer to home, the on-again, off-again commitments by the US to reducing its carbon emissions, reflect some of the difficulties encountered as a result of our reliance on nation-states to provide an appropriate response to the problem confronting us. By framing the problem as a political one to be solved by nation-states, the individual humans inhabiting these countries find themselves-for better or worse-unable to claim or assume any responsibility for global climate change. Many of us in the high-income, developed countries of the world act as if our only possible contribution to solving the existential problem posed by global climate change is to make sure we vote for the "right" candidate. Furthermore, by framing the problem as one to be addressed politically, those of us enjoying life in a democracy inadvertently force our politicians to devise solutions that are politically attractive to the majority of us or to our elected representatives. In the US, this means rather than tackle the problem at its root, we instead favor regulating production, not consumption. Our insistence that producers bear at the regulatory burden for emission reductions reflects the fact that households have franchise, and producers do not.

Additionally, by calling on the "nations of the world," to address the problems created by preventable carbon dioxide emissions, the exhortation has implicitly required science to move from the lab and the pages of refereed journals to the ballot box and the op-ed pages, as scientists work to inform politicians and public opinion. Forcing scientists into advocacy roles as science advisors to elected representatives has undermined belief in the scientific objectivity of both natural and social scientists.<sup>24</sup> While in 1974, roughly 50 percent of the American populace, liberals and conservatives, agreed that they "trusted in science," by 2010, trust in science among self-identified

<sup>&</sup>lt;sup>24</sup> Alec Tyson and Brian Kennedy, "Public Trust in Scientists and Views on Their Role in Policymaking," *Pew Research Center* (blog), November 14, 2024, https://www.pewresearch. org/science/2024/11/14/public-trust-in-scientists-and-views-on-their-role-in-policymaking/.

conservatives had fallen by almost 25 percent.<sup>25</sup> And between 2008 and 2010, among self-identified conservative Americans surveyed, "belief" in the phenomenon of global warming fell from 50 percent to 33 percent.<sup>26</sup> As scientists moved from describing the phenomenon of climate change to advocating for policies to respond to it, scientists suffered a loss in credibility.

The problem created when one moves from describing what *is* to advocating for what *ought* was first described by David Hume in *A Treatise on Human Nature*. Hume writes that:

In every system of morality, which I have hitherto met with, I have always remark'd, that the author proceeds for some time in the ordinary way of reasoning, and establishes the being of a God, or makes observations concerning human affairs; when of a sudden I am surpriz'd to find, that instead of the usual copulations of propositions, *is*, and *is not*, I meet with no proposition that is not connected with an *ought*, or an *ought not*. This change is imperceptible; but is, however, of the last consequence. For as this *ought*, or *ought not*, expresses some new relation or affirmation, 'tis necessary that it shou'd be observ'd and explain'd; and at the same time that a reason should be given, for what seems altogether inconceivable, how this new relation can be a deduction from others, which are entirely different from it.<sup>27</sup>

Hume argues that it is impossible to reach normative conclusions from positive facts. As noted by Lynda (Walsh) Ohman in her study of the use of rhetoric by scientists in their discourse with the public, Hume's observation exposes a "logical gap between 'is' and 'ought' [that cannot be] bridged without the application of something extra: a priori values."<sup>28</sup> Absent an agreed upon set of *a priori* values, neither science nor nation-states can use science to determine what a

<sup>&</sup>lt;sup>25</sup> Gordon Gauchat, "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010," *American Sociological Review* 77, no. 2 (2012): 176.

<sup>&</sup>lt;sup>26</sup> Gauchat, "Politicization of Science in the Public Sphere," 175.

<sup>&</sup>lt;sup>27</sup> David Hume, A Treatise of Human Nature, 3.1.1.

<sup>&</sup>lt;sup>28</sup> Lynda C. Walsh, *Scientists as Prophets: A Rhetorical Genealogy* (New York: Oxford University Press, 2013), 86.

nation-state, or even the individuals residing in nation-states, *ought* to do in response to the scientifically documented fact that increases in atmospheric carbon dioxide concentrations lead to increases in global temperatures. The sort of benefit-cost analysis that William Nordhaus engages in assumes an entirely different set of *a priori* values than those likely held by Greta Thunberg.

This is where the church can assume an active role. Church teachings—care for the poor and the vulnerable, love of neighbor, stewardship of God's creation—can cultivate a set of *a priori* values that help us move from the *is* to the *ought*. Church teachings can also help us reach the final Kübler-Ross stage as we confront the reality of, rage at, bargain with, and become depressed by the changes in climate. The church can help us achieve acceptance.

## FAITH-BASED ACCEPTANCE

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When we stop blaming others for problems we ourselves bear responsibility for creating, when we stop shirking our responsibility and try to live within our means on this God-created, God-loved, and God-redeemed planet, when we claim and honor our role as stewards of God's creation, and when we trust God's promise to be with us, love us, protect us, and care for us, even when we fail in all of the above, then we can move to a faith-based acceptance of the material circumstances and material challenges presented by our past, future, and ongoing contributions to atmospheric carbon dioxide concentrations. That acceptance will be characterized by taking responsibility for doing what we can do to steward our climate as part of God's creation.

The church has the opportunity and the calling to help us move to this stage. As Christ recognized the importance of the widow's mite, faith-based acceptance of global climate change understands that scale is not the measure of importance. While the arguably small effects that the extra sweater, or the shorter shower might have on GHG emissions have discouraged many of us from making even these limited contributions, small things do matter. NASA's Jet Propulsion Laboratory relies on a  $\pi$  value carried out to the quadrillionth of a unit (3.141592653589793) to determine trajectories of its spacecraft.<sup>29</sup> As much as a quadrillionth of a unit of measurement could make the difference between success and failure of a NASA launch. Perhaps one quadrillionth of a ton of carbon dioxide emissions can make a difference to us.

Can the church encourage, by its own example, that a onequadrillionth of a ton reduction in our own carbon dioxide emissions matters? One quadrillionth of a ton weighs just 2 trillionths of a pound. What tiny changes can our churches make and encourage to achieve a one-quadrillionth change in their emissions of GHGs?

Producing a sheet of office paper results in emissions of 4.64 grams of carbon dioxide.<sup>30</sup> This means that 5.11 pounds of carbon dioxide are emitted in the production of a ream of paper. What if churches dispensed with the Sunday bulletin, even just one Sunday per month, and let the congregants know that this was in support of reducing GHG emissions? By honoring the small contributions, those of us who cannot afford to purchase an array of solar panels, or a battery-powered vehicle, or those of us who live too far away from their place of employment to consider biking to work might be encouraged to look for our own perhaps more modest ways to contribute to the stewardship that we understand to be our duty. The God who created not only atoms but even sub-atomic particles will recognize these efforts, and the Church can help spread that news. What if "stewardship Sunday" extended to ask people to consider, as part of their pledges, commitments to stewardship of God's creation?

In the meantime, I find inspiration from two authors. First, Jonathan Franzen, writing in *The New Yorker*, offers secular but nonetheless wise advice to individuals who find themselves feeling dwarfed by the magnitude of the climate challenge, and struggling to find an

<sup>&</sup>lt;sup>29</sup> "How Many Decimals Of Pi Do We Really Need," *NASA Jet Propulsion Laboratory (JPL)*, https://www.jpl.nasa.gov/edu/news/how-many-decimals-of-pi-do-we-really-need/.

<sup>&</sup>lt;sup>30</sup> Ana Claudia Dias and Luis Arroja, "Comparison of Methodologies for Estimating the Carbon Footprint Case Study of Office Paper," *Journal of Cleaner Production* 19, no. 1 (2011): 30–35.

appropriate individual response to reducing the 38 billion gigatons of GHG that human activity is emitting annually. Franzen writes:

And then there's the matter of hope. If your hope for the future depends on a wildly optimistic scenario, what will you do ten years from now, when the scenario becomes unworkable even in theory? Give up on the planet entirely? To borrow from the advice of financial planners, I might suggest a more balanced portfolio of hopes, some of them longer-term, most of them shorter. It's fine to struggle against the constraints of human nature, hoping to mitigate the worst of what's to come, but it's just as important to fight smaller, more local battles that you have some realistic hope of winning. Keep doing the right thing for the planet, yes, but also keep trying to save what you love specifically-a community, an institution, a wild place, a species that's in trouble—and take heart in your small successes. Any good thing you do now is arguably a hedge against the hotter future, but the really meaningful thing is that it's good today. As long as you have something to love, you have something to hope for.<sup>31</sup>

And my second inspiration comes from the author of Psalm 29, who writes that:

"The voice of the Lord causes the oaks to whirl, and strips the forest bare, and in his temple all say, 'Glory!"

God has been with us; God is with is; and God will be with us. Even through climate change. Let us all say "Glory!"

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<sup>&</sup>lt;sup>31</sup> Jonathan Franzen, "What If We Stopped Pretending?" *The New Yorker*, September 8, 2019.