

**GOOD ENOUGH FOR
THE CLIMATE**

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**The Surprisingly Simple Math of the Planet and Inspiring
Stories of Action and Innovation**

James Earl Anderson

Dedication

To my children Colette James, June Naomi, and Lucy Rose.

You are the inspiration for all the good things I try to do.

As we say when we go camping, "leave no trace." Here, now, we must do one better. I hope we do that for you.

XO. Daddy

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Introduction

Good Enough for the Climate

The surprisingly simple math of the planet, and the inspiring stories of action and innovation needed to win the climate fight.

As I write this, there is a daily news drumbeat of the impacts of climate change. For another year, wildfires are setting records in the western US. Flooding and heatwaves ravaged Europe this summer. Intensified by climate change, Hurricane Ida paved a path of heavy rain and historic flooding from the Gulf Coast to New York City. It's easy to think these problems are new and unprecedented, but as will be illustrated in the following chapters, there are amazing stories of people who have been working on these issues for decades.

Ricardo Bayon has been working on climate policy and finance since before climate change was a big public issue. He puts you at ease when you speak with him. He's kind and thoughtful. In 1992, Ricardo was working on one of the first climate treaties ratified at the Rio Earth Summit—fourteen years before Vice President Gore's climate documentary, *An Inconvenient Truth*, came out in 2006 and popularized (or demonized) the climate issue for many (Guggenheim, 2006).

After helping launch and managing Ecosystem Marketplace, Ricardo and his business partner founded EKO Asset Management in 2008 with a plan to enter the European Union Emissions Trading System (ETS). The ETS was born in 2005 to set a price on CO₂ emissions and incentivize big industry to gradually lower their CO₂ output (Ellerman, 2007). The ETS was showing promise and Ricardo and his partner wanted in. They were in London to sign the agreement, pen nearly on paper, when the Lehman Brothers collapse came across the Bloomberg Terminal. The deal was off, and EKO had to pivot fast. They found a solid investment thesis in setting up a Green Carbon Fund to generate carbon credits for the voluntary emissions trading market in the US, and ultimately for the California Air Resources Board (CARB) cap-and-trade program. At the time, this was a very novel way to pay landowners—in this case forest owners—for the climate benefits of preserving their forests.

EKO was a success and generated significant return for investors. The company created carbon credits and put a price on CO₂ emissions. Under CARB's program, significant emitters of CO₂, like large power plants, only have a permit to emit a set amount of CO₂—a cap. If they want to go over that cap, they must offset those emissions by purchasing a certified carbon credit from someone like EKO. It was the early days, and these markets were new. Standards were hard to come by and they still need

improvement today. Yet, these actions in a small way helped create the foundation for rapidly expanding efforts to put a transparent market-based price on CO2 emissions today.

At around the same time, Chris Adamo was working as a staffer for US Senator Debbie Stabenow. President Obama had just been elected, and there was the feeling a national CO2 emissions trading scheme would come to fruition. The House of Representatives had passed a cap-and-trade bill, and there was a group of senators building a coalition to pass their own version. Many thought this was a done deal. The land sector—farmers—were brought into the fold with the promise of new revenue streams to support land management practices to protect the environment, sequester CO2 from the atmosphere, and reduce agriculture's carbon footprint. Like many constituencies, they were disappointed when the bill faded in the drive toward the mid-term elections. Democrats lost big in those elections, and major climate legislation took a back seat for years to come.

In 2011, Stabenow became Chair of the Senate Agriculture Committee and Chris was appointed Staff Director. As they were working on the Farm Bill, he saw a broad expanse of programs that could be oriented to bring the land sector into the climate fight. The Farm Bill is a river boat full of programs for managing our nation's farms and forests—a \$6 billion conservation budget, \$30 billion in farm credit, a range of US Forest Service Programs, and more. It wasn't cap-and-trade, but it was a wide array of programs to make progress on reducing greenhouse gas emissions and removing CO2 from the atmosphere.

Today we see an expansion of this thinking as the Biden administration takes a whole government approach to address climate change. A myriad of executive actions, spending changes, loan guarantees, rule makings, and other policy adjustments at all levels of the federal government, across all agencies, are accelerating and expanding the response to climate change. This is how government works. It's messy and at times seems inefficient and incoherent.

Too often, people are looking for that one thing, that perfect thing, to solve the climate crisis, but what would happen if we stopped looking for the perfect solution and simply took action? Ricardo's and Chris's stories exemplify the challenges and pivots involved in any innovative endeavor. I set off on a journey to find out what would happen if we just started trying to be *good enough for the climate*.

When Vice President Al Gore published *An Inconvenient Truth*, it was met with deep fear by some and profound skepticism by others. Some thought climate change was an intractable existential crisis, too big and complex for us solve. Others thought it wasn't a problem at all. How could a group of odorless, colorless gasses that exist in trace concentrations in a vast atmosphere have a significant impact on our lives? Were the dire predictions going to be true? As much as the climate issue was illuminated and brought into public view, skeptics were empowered as well.

However, the pursuit of dogged, careful science over decades has taught us better. Since the Industrial Revolution began around 1870, climate change, has largely been driven by an increase in the concentration of man-made carbon dioxide (CO₂), methane (CH₄), and a host of smaller pollutants in the atmosphere. It is a wickedly huge and complex global problem. It is impacting nearly every aspect of our lives. It threatens the ecosystems and natural processes on which humans depend. This set of facts isn't debatable anymore and hasn't been for a long time. Reversing this trend will be difficult.

We need to completely retool the way we live to avoid the worst climate change impacts. Today we are just getting a little taste of the severe weather impacts that could come. In 2016, I attended a conference of the American Meteorological Society. At a reception, I ended up drinking margaritas with a physicist and climate researcher from Cal Tech who was also a self-described mixologist (with some surprise, he declared the premix margaritas served to us in plastic cups "not too bad"). He said, almost glibly, he had run the models and the carrying capacity of the world would decline to 2.5 billion people in the next hundred years (there are currently about eight billion humans in the world). That number could certainly be wrong, but it implies a "shit ton" of disruption. It's understandable to think the problem is too big to solve.

At times, it feels like we haven't made much progress. Global concentrations of CO₂ in the atmosphere continue to rise. As I write this, they have topped 420 parts per million for the first time (NASA, 2019). Only 37 percent of the world's electric supply comes from low-carbon sources (Rhodes, 2021). The global pandemic doesn't seem to have slowed the pace of climate change. The cherry blossoms bloomed the earliest they have in 1,200 years in Kyoto. The weakening polar vortex slung freezing temperatures into Texas in March 2021, collapsing an electric grid that wasn't resilient enough to handle it, causing nearly statewide power outages for a week or more. Sea temperatures and levels are rising. The year 2020 was the worst wildfire season ever recorded in the western United States, and 2021 is headed in the same direction. It's demoralizing. You can feel the tension, the tiredness, and the burnout.

However, today there is renewed momentum. As I write this, Earth Day has arrived. From a policy perspective, the Biden administration is flexing all the tools available to make progress: issuing executive orders, holding a global summit on climate change, making more aggressive decarbonization pledges, and trying to push a climate mitigation-focused infrastructure bill through the narrowest majority in Congress. Momentum within the private sector is growing rapidly. Numerous major companies are making net-zero pledges—the commitments to eliminate or offset emissions from their operations by set dates. General Motors has announced it will stop making internal combustion engines by 2035 (Yurkevich, 2021).

I believe we are making more progress than it might seem and that even though the progress may be halting at times, the compounding impact of this progress results in big gains as we move forward. In writing this book, I encountered amazing people like Ricardo and Chris who are innovating with creative

solutions, experimenting, and pivoting across many different fields of endeavor to mitigate climate change.

My big idea, and it may be heretical, is “we got this.” It will be immensely difficult, and it will cost way more than we are currently dedicating to the task. But we have the knowledge and the resources to mitigate climate change, avert the worst of its effects, heal our ecosystems, and create better-adapted, more resilient communities to take us into the next century and beyond. I think there are principles of action and innovation that can guide us along the way. I think there are loads of inspiring stories that show us how it can be done.

Finally, I think we are at the cusp of a broad reshaping of our view toward the natural environment and our place in it. Our efforts to address climate change can foster the formation of a new environmental awareness that brings the value of our ecosystems into the mainstream as never before.

In *Enlightenment Now*, Steven Pinker makes a compelling case for optimism. He points out progress quickly hides its tracks. Our reference point changes as we make progress. What once seemed impossible becomes possible, and we quickly forget all the incremental steps that got us there. Change is also not a gradual or linear process. Over and over again, we see that change comes slow, then fast. As threshold conditions are met, large changes occur rapidly. If you gradually increase the temperature of a block of ice, it doesn't slowly melt. It all melts once you exceed 0 degrees Celsius. Over the last decade or more, the proportion of electricity generated from low-carbon sources has only increased a few percent. However, we've only recently reached a threshold where the cost of renewable power from wind and solar is on par with or cheaper than coal. Only recently have we begun to internalize the environmental cost of sequestering the CO₂ from burning the coal. This will make the math even more favorable.

Many have convinced themselves the problem is impenetrably complex and huge. On the contrary, the math of climate change is not that complicated, and it's largely incontrovertible. At present, we add about fifty billion tons of CO₂ to the atmosphere each year according to the Intergovernmental Panel on Climate Change (IPCC). We need to get to zero in thirty years or less to have a decent chance of avoiding the worst impacts of climate change. Large sectors of our economy account for the greatest proportion of emissions. Manufacturing is responsible for 31 percent. Energy production accounts for 27 percent. There is 19 percent that comes from growing things, mostly for food, forage, and fuel. 16 percent is for transportation. The last 7 percent is for heating and cooling buildings (Gates, 2021).

The first step is to electrify everything and stop using fossil fuels to create electricity. We know how to do this. Most of the technology and infrastructure necessary to get this done is in large-scale use today. It will be expensive and hard. We will get things wrong, and some stuff won't work along the way. We will have to learn, pivot, and try again. More action needs to be taken and the pace of change needs to

accelerate. We'll need to spend a lot more money and redirect an entire financial system to do so. Electrifying everything also takes care of most of the emissions in the transportation sector as well. Cars, delivery vehicles, most trucks, and all urban transportation can be electrified. Electrification could also decarbonize heating and cooling buildings.

Adoption of regenerative agriculture and forestry practices can greatly reduce CO2 output from growing food, and in many cases, create positive carbon sequestration benefits. Electrifying transportation means we need less ethanol, thus less acres of corn and less of the fossil fuels used for synthetic fertilizer and tractors.

Manufacturing stuff is the hardest part. Whether it's manufacturing concrete or making steel, there are many processes that create CO2 and other greenhouse gases. This is an amazing area for innovation. New forms of manufacturing and recycling materials can lead to significant reductions in emissions. We are also going to have to create and rapidly adopt better ways of capturing the CO2 generated from these processes and sequester it for the long term.

In all areas where emissions can't be cut to zero, we need to put a price on those emissions sufficient to offset them through removal and sequestration. Much of this sequestration will necessarily be from nature-based sources. The oceans hold immense potential for greater sequestration. Protecting our ecosystems and preserving more land and ocean areas could balance our carbon budget and bring that fifty billion tons to zero or negative. One great attribute of conservation-based solutions is that in many cases they are inexpensive and low tech. Preserving land (largely leaving it alone), planting trees on large scale, and preserving large swaths of the ocean doesn't require tons of investment in new technology development and scale up. The challenging part is measuring the benefits. Nature is vast and complex. It doesn't give up its secrets easily.

Getting all this done will be hard, but the large-scale math is well established and simple. Many of the solutions exist and with hard work, ingenuity, and massive investment, we can get there. Our bias should be toward action. Momentum creates its own success.

So why pay attention to me? It's a fair question. I can say this book was fueled by an interest in and passion for the natural world that I've felt since the first time I climbed (and fell out of) a tree in Madison, Wisconsin. I've studied and been around environmental policy and economics most of my adult life. Spending three weeks paddling through Ontario with the Voyageur Outward Bound School, studying ornithology in the Zoology Department and environmental policy in the Department of Environmental Studies at the University of Wisconsin, and working as a research assistant at the Aldo Leopold Reserve near Portage, Wisconsin, have all been seminal experiences that long ago fell off my resume. Working at Earth Networks and now Advanced Environmental Monitoring (AEM), I found a professional setting that married my interest in business with environmental science, economics, and

public policy. It's that combination of experiences I bring to this effort. I've trained this base of knowledge, along with curiosity and a genuine desire to better understand these issues, to help mitigate climate change in a way that enriches the biome on which we depend, here in our little spaceship Earth.

This book is for curious and, I hope, some skeptical folks who want to learn more about the stories of people trying to address the climate crisis. It's also for the entrepreneurs, investors, policy makers, and advocates looking for ideas on how to accelerate the vast array of initiatives and changes underway to reshape our economy, and how we interact with the natural world, to make it more sustainable. In particular, Part 2 outlines principles I think can help us make faster progress, and Part 3 tells numerous stories of the inspiring work being done to increase the rate of change. I hope it spurs loads of creative thought about potential approaches to climate change mitigation. There are so many avenues for productive endeavor that can have real positive impact on this problem. There is room for the first climate trillionaire and many millions of entrepreneurs, investors, advocates, policy makers, scientists, engineers, field technicians, and many, many more to have an impact in this area. In fact, it's axiomatic that for us to meet this challenge, this must be true. The scale of the endeavor requires it.

I hope this book accomplishes a couple of things. First, I hope it's as fun to read as it was to write. I can honestly say it's been surprisingly and fantastically fun. I'm immensely grateful for the opportunity. Writing this book has been a personal revelation. Second, I hope it provides a positive view of our future and our ability to solve this problem. I don't mean a Pollyannish or naive one. This is *hard*. We need vast investment and more ingenuity than ever before. It's a complete retooling of the economy and the built world and a reinvention of how we interact with the natural world (let's stop pretending they are separate things). Without hope, there will be no action. The solutions are there for us to realize it. *We got this.*