

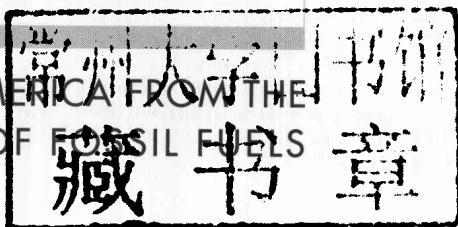
**FREEING AMERICA FROM THE
TYRANNY OF FOSSIL FUELS**

clean energy nation

**CONGRESSMAN JERRY MCNERNEY, PH.D.
and MARTIN CHEEK**

CLEAN ENERGY NATION

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TYRANNY OF FOSSIL FUELS



Congressman Jerry McNerney, Ph.D.

and

Martin Cheek

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To Mary McNerney

*The human race is challenged more than ever before
to demonstrate our mastery—not over nature but of ourselves.*

RACHEL CARSON (1907–64), AMERICAN BIOLOGIST
AND AUTHOR OF *Silent Spring*

FOREWORD

Once before, America stood on the threshold of a renewable-energy revolution. In the late 1970s, wind farms were popping up in California. Companies making solar photovoltaic cells were attracting waves of new capital. Passive solar building designs, ultra-efficient windows, and energy-saving lamps were all very chic. Biofuels had strong supporters in the farm and forestry sectors, and national labs were exploring cellulosic ethanol and diesel fuel from microalgae.

President Carter had declared a goal of obtaining 20 percent of the nation's energy from renewable sources by the year 2000, and he had installed solar water heaters on the White House. New policies and funding would be needed to achieve the 20 percent goal, and I headed the federal laboratory charged with producing the policy roadmap. For reasons that still remain baffling, the Reagan administration was extremely hostile to renewable-energy sources. It ignored the policy roadmap and systematically crushed the wind, solar, and biofuel programs. President Reagan even ordered that the solar water heaters be ripped off the White House. For the last three decades, the renewable-energy industry has been something of a backwater in America.

Meanwhile, the rest of the world began waking up. Japan started pushing the envelope on solar electricity, and then Germany adopted a feed-in tariff that gave the industry a great shot of adrenaline. Worldwide solar sales have been growing 50 to 60 percent per year for the last decade. Denmark kept expanding the frontiers of wind technology; its innovations are now bearing fruit around the world. Enormous strides have been made in mapping and drilling deep for geothermal resources.

In the United States, we are finally beginning to elect some public officials with scientific backgrounds—and even a handful with personal experience in the renewable-energy field. At the head of that list is Congressman Jerry McNerney, an engineer with a Ph.D. in mathematics who has spent two decades working on renewable energy.

Representative McNerney and his coauthor, Martin Cheek, a Silicon Valley writer, have produced *Clean Energy Nation*, a timely, eminently readable assessment of the renewable-energy prospect. As suggested in its subtitle, *Freeing America from the Tyranny of Fossil Fuels*, it is a frank discussion by smart, experienced people who are not expecting any campaign contributions from Exxon or Peabody. *Clean Energy Nation* is provocative while not being hysterical; it is solidly researched but not laced with jargon and equations; it is hopeful but not naïve.

In *Clean Energy Nation*, McNerney and Cheek show readers that tomorrow can be much brighter if only the United States will seize back its former leading role and transform itself into a nation powered by the superefficient use of sustainable sources of energy. The impending peaking of the world's oil production, the boatloads of money being shipped to the Persian Gulf, and the myriad problems stemming from global warming should provide powerful motivation.

This inspiring book challenges its readers to become leaders themselves and to take personal and political action. The road ahead will not always be an easy one. But when humanity reaches the destination of genuine energy independence, the journey will have been well worth the effort.

Denis Hayes,
President of the Bullitt Foundation

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INTRODUCTION

A Declaration of Energy Independence

In the summer of 1776, America stood at a crossroads. Inside the Pennsylvania State House in Philadelphia, the representatives of the thirteen colonies struggled among themselves in a debate just as hot as the heat wave then broiling the city. The members of the Second Continental Congress argued about the question of independence—specifically, on the issue of whether to cut the political cord tying nearly 3 million Americans to King George III's despotic government. They sought to achieve something never before seen in all of human history. To explain to the world why the colonies were determined to be “absolved from all allegiance to the British Crown,”¹ the Congress assigned five of its delegates to a committee set with the task of creating a document detailing the reasons the American people had a right to live in free and independent states. Serving on that committee was the thirty-three-year-old Thomas Jefferson, a Virginian. His brilliant genius for forging lofty phrases captured the American spirit in the Declaration of Independence. Jefferson's now-famous words, succinctly stating that ordinary people have the right to govern themselves and determine their own destiny, gave birth to a new nation founded on the principles of liberty and democracy. Ever since its creation on July 4, 1776, the United States of America has followed an often arduous but always rewarding road of constant protection and sometimes expansion of its citizens' freedoms, rights, and independence.

Today, America stands at a new crossroads. Inside the halls of the U.S.

Capitol Building in Washington, D.C., the representatives of the fifty states now struggle over the direction our nation must take on energy policy. We debate with the same passion that the Founding Fathers did in Philadelphia during the sweltering summer of 1776. Today's members of Congress now face the question of energy freedom—specifically, how to cut the cord tying more than 300 million Americans to fossil-fuel addiction. The question of how to achieve our energy freedom is complex and similar to the struggle faced by the signers of the Declaration of Independence. Our nation's success or failure in manifesting this necessary goal will determine what form our civilization will take in the future. We are facing a dual crisis. First, there is a limited supply of fossil fuels. With consumption growing every year, Earth's supply will start to dwindle, causing gross instability in the price of fuel. Second, the atmosphere has reached its limit to absorb carbon without causing a rapid increase of energy in the atmosphere and oceans. Either problem by itself is a daunting threat. Combined, they pose a massive challenge to modern civilization.

The approximately 9 billion people predicted to be living on our planet within two generations will face dramatic social, political, and economic upheavals without significant improvements in energy efficiency and the increased use of alternative fuel sources. Wars will arise as nations struggle with each other to compete for rapidly depleting oil sources and cope with shifting climate patterns. The global economy might very well collapse as industries fail for lack of power to manufacture their products or miss the means to distribute these goods in a transportation network once driven by oil-based fuels. Without power to pump water or operate farm equipment, people in urban regions might face mass starvation. Chaos could break out as desperate people resort to unlawful actions to survive in a world lacking the necessities that fossil-fuel-driven industry once provided. This is a harsh future we must not leave to our children and their children. We can avoid this dark fate and minimize the harm from climate change by taking the necessary steps now to build for ourselves and for posterity a future fueled by clean and renewable-energy sources in a clean and efficient economy.

One major barrier we must clear in dealing with our energy and climate

challenges is that global climate change violates one of our basic assumptions. We presume that Earth's natural bounty will always be there for us. We know that people are fickle, that weather is unpredictable, but throughout history, our planet has rebounded and somewhere things are normal. Climate change challenges this presumption. Over decades, plains and savannas will become deserts. Polar and glacier ice will melt in the warming. Florida and New York City may disappear under ocean waves. The environment is going to change. But we can, too. We can take the steps—steps we *must* take—to mitigate the impact of global climate change. To do that, we must build an international consensus to organize and implement a plan of massive action. That in itself will be a huge social transformation. That's why we must think of this impending climate crisis not only as a major threat but also as a significant opportunity for motivating us all to achieve global energy freedom.

There will be considerable risks and failures involved in developing alternative fuel sources and in minimizing climate change. However, the rewards that will come from America's achieving its energy freedom will make us a much stronger nation and will strengthen the bonds with other nations, as well as provide the ingredients for a more stable world. Energy freedom will help secure our nation's natural environment as well by reducing the air and water pollution from toxic fossil fuels that now damages the health of many of our citizens. The innovative technologies generated in striving for energy freedom will also open wide the gates to economic prosperity for many Americans. New businesses will arise, providing significant opportunities for daring entrepreneurs, stock investors, and venture capitalists. Newly formed companies will generate good jobs for hardworking people. And if promoted globally, the new energy technologies and the accompanying economic prosperity they bring will create a ripple effect throughout the world, helping to stimulate economic development in foreign countries.

Of course, there are those critics who claim that investing in alternative energy is a waste of money because conventional oil is still "cheaper" in a free-market economy than clean and renewable sources of energy. That argument, however, is not credible if the hidden costs of oil are included in

the calculations. If we consider the subsidies that big oil companies take from the U.S. taxpayers—at a time when those petroleum producers are making record profits—then we discover that the true cost of that oil is not “cheap.” We might have learned an important lesson from the 1973 OPEC oil embargo, a period where we discovered firsthand how quickly our national economy can be manipulated and threatened by petroleum politics. If American policymakers had kept us on the course toward energy independence started during the Carter administration, we would not be facing our current crisis. Even so, there are still those politicians and pundits who fail to learn from history. Skeptics daily discourage us from aggressively reducing our dangerous dependence on fossil fuels, arguing that this action will irreparably hurt our economy and cause the “medievalization of the world.”² Skeptics also claim that developing the technology and infrastructure to support clean and renewable energy across the nation is a task too costly and impractical to implement in any reasonable time frame. They insist the odds are impossibly high against success for energy freedom. These people fail to understand the American spirit. The United States is a nation that, from its very conception, has persevered against impossible odds—and has prevailed over those odds to achieve miraculous results. Despite facing the mightiest military power in the world, the American colonists achieved the impossible with a decisive victory against the British at the Battle of Yorktown in 1781. That triumph proved to be the turning point of the Revolutionary War. Eighty years later, the United States, led by President Abraham Lincoln, surmounted the grave challenge of a devastating civil war over the issue of slavery. With peace achieved in 1865, we underwent a painful rebirth as a nation dedicated anew to an expanded principle of freedom. In the 1940s, “the Greatest Generation” battled impossible odds to fight fascism and bring lasting liberty to Western Europe and Japan. In the last century, American patience and diligence helped us survive a forty-year threat of nuclear annihilation that ended with the fall of the Berlin Wall in 1989.

In today’s America, we see daily the impact that our energy consumption has on our lives. The Deepwater Horizon oil spill made headlines in mid-2010 as it sullied the coastal beaches and damaged local economies of our

states bordering the Gulf of Mexico. The recent Arab democracy movements in the Middle East to overturn dictators propped up by oil profits drove up crude oil prices and rippled throughout the world's economy. In 2011, we witnessed distressing evidence that non-fossil fuel sources of energy also have serious environmental and economic consequences. The catastrophic earthquake and tsunami that hit Japan severely damaged the Fukushima Daiichi nuclear power plant. The resulting release of radiation and the worldwide fears arising from potential reactor core meltdowns served as a reminder that gaining power from uranium atoms has risks. Public opinion shapes public policy. American citizens must understand that energy comes with costs, and a national conversation is needed on creating a comprehensive, long-term U.S. energy policy that takes into account the kind of future we want to see in America and worldwide.

Many of America's brightest minds are now working hard on the challenge of pursuing energy freedom. Almost daily, scientists and researchers are finding solutions that can transform our world. Humans are, by nature, resistant to transformative change until conditions are intolerable. We should look ahead and embrace change before we reach that point. The authors of this book realize and appreciate the challenge our nation and world face in meeting future energy needs. It is indeed difficult to imagine a future different from the present because our lives are utterly intertwined with fossil fuels. However, we challenge readers to share our vision of a clean and efficient America and a world with a sustainable-energy economy, with clean and quiet electric cars, with wind turbines gracing the landscape, with solar panels on our rooftops and solar plants in remote deserts, with prosperous family farms producing ecologically balanced biofuel feed stocks alongside food stocks, and with the nations of the world cooperating to manage global and local climates. We can transform our future, creating both jobs and energy in the process, and open up new chapters in human history. A bright tomorrow is indeed within our reach.

The vast majority of Americans truly want their nation to achieve energy freedom.³ We believe our nation—with persistence and imagination—can realize that grand ambition. We understand that, united together, we must

follow this course to energy freedom. Whether we call ourselves Republican or Democrat, or hold other political leanings, most citizens can plainly see the tremendous blessings that will come to them and their children if the United States makes the dream of energy freedom a reality. People want to live in a better and safer world. They want to be able to wake up in the morning and have no cause to worry that today there might be no usable energy to let them live their lives as they are accustomed to living. The social will always pushes the political will. That fact is certainly being felt today as a growing number of Americans encourage their local, state, and federal representatives to strive for energy freedom for the preservation of our nation's values.

As we progress further into the twenty-first century, America's leaders must face an important truth. They should recognize that our nation has a mandate to guide the rest of the world down a road promoting energy freedom through the development of new fuel-efficient technology linked with clean and renewable sources of power. The United States must begin making rapid progress in becoming highly efficient in replacing its widespread use of fossil fuels with energy from solar, wind, water, biofuel, geothermal, and hydrogen-based power sources. We live in an exciting time, a defining moment in human history, when we can and must take the steps necessary to achieve energy freedom that will benefit all humanity. If America is to fulfill the noble promise made by Thomas Jefferson in 1776, we must declare our energy freedom and attain that vital goal before we run out of time.

We now stand at the crossroads. Which road will we choose?

SECTION ONE

AMERICA'S ENERGY PAST AND PRESENT

Before we can establish where we are going in our national energy journey, we must know where we now stand and understand how we got here. It's important to consider the past and present of America's energy story so that we can have the background knowledge we need to put into historical perspective the various issues we'll examine more deeply later in this book. In Chapter 1, we'll look at why we are facing the end of the fossil-fuel age and contemplate what it might mean for the future survival of our republic and our civilization. In Chapter 2, we'll explore the process by which the United States gradually became so dependent on fossil fuels for driving its economic, social, and political institutions. Finally, in Chapter 3, we'll analyze the various energy opportunities available to replace fossil fuels, and we'll examine the positive and negative aspects of their widespread use in American society.

CHAPTER 1

The End of the Fossil-Fuel Age

Imagine what your life would be like if the world suddenly lost its hydrocarbon power. If, for some reason, all the supplies of oil, coal, and natural gas on our planet vanished, you would be faced with life far different from the one you now know. Flick the light switches in your home and you would still be left in the dark. No matter how hard you pressed the buttons on the remote control of your TV set, *Survivor*, *American Idol*, and every other broadcast show would still fail to appear on the screen. You wouldn't be able to listen to music, from Bach to Bruce Springsteen, on your living-room stereo system. You wouldn't be able to surf the Internet, because your personal computer or laptop would sit on your desk as a useless piece of high-tech rubbish. And you wouldn't be able to call friends or family members, because the global phone system cannot function without energy. Your morning shower would be an unpleasantly frigid one, because no electricity or natural gas would be available to operate your hot-water heater. But most likely no water would come through your home's plumbing anyway, because it takes power to pump it to your neighborhood from the municipal reservoir or a well. Much of the food in your refrigerator and freezer would spoil after a few days, because there would be no electricity to run those kitchen appliances.

Whether you live in a small town or a major metropolis, your community could rapidly collapse into disorder without fossil fuels. After sunset, streetlights would stand useless, and crime could increase dramatically.