NINE

IT'S A GAS

The United States and the Oil Shock of 1973-1974

Norman Reichbach and his customers probably had given little thought to the limitations the natural world imposed on them. Riding on rubber tires and pavement in pursuit of their dreams, they sped over hills and rivers, sliced through snow, rain, and darkness, and collapsed time. In negating environmental obstacles with their machines, they minimized the impediment of their bodies. No matter how flabby, infirm, aged, injured, or ill, they crossed the landscape with ease. Their mechanical mastery of nature afforded them a luxury that they often took for granted: insulated from the scenery, they more fully enjoyed it.

Then their world and their perception of it changed. The movement of oil from its underground sources slowed by 1973, and thousands of service station operators across America—Norman Reichbach and many others—no longer had as much gasoline to sell. No longer were they and their customers so free; no longer could they ignore so easily the number and cost of their trips and the potential consequences if they ran out of gas. As the needles on their fuel gauges inclined toward empty, nature mattered a little more. Hills appeared higher, winter winds felt colder, and distances seemed greater—all because they no longer could assume the availability of a fuel that was little more than a processed fossil soup.

As dealers ran dry and shut down their pumps, drivers formed long lines at the stations that remained open, including Reichbach's City Line Flying A at 1 Central Park Avenue in Yonkers, New York. The lines were not simply a function of shortage. Doubts and fears also impelled motorists to the pumps.

Worried that they might not find gas when they needed it, they took every opportunity to top off their tanks. The intensity of their demand prompted some states to pass laws intended to distribute the flow evenly. New York mandated that dealers not favor regular customers, fill tanks on alternate days depending on odd- and even-numbered license plates, and serve only motorists whose tanks were less than half full. Still, the regulatory measures did not calm anxious drivers.1

Reichbach felt the strain no less than did his customers. He had never had much reason to anticipate a shortage. Perhaps he recalled that the federal government had rationed fuel during the Second World War, but he had been a boy then, and his more recent experience of postwar abundance probably dominated his consciousness. He and a partner, Philip Guidano, had opened City Line Flying A in 1962, when oil flowed freely, the economy expanded, and people purchased automobiles as never before. For some ten years, the two men profited from their small enterprise, but late in 1973, their circumstances suddenly changed. Getty Oil, their gasoline supplier, reduced its deliveries by 30 percent. Although Reichbach and Guidano charged their customers more per gallon, the price increase could not compensate for the drop in sales.2

As the gasoline supply dwindled, Reichbach's cordial relationship with his customers deteriorated. They began to pressure him, not only to ensure that he sold them gas but also to persuade him to sell more than the law allowed. Some tried a soft approach, offering him liquor, neckties, money, and other gifts. Others tried to ingratiate themselves by assuming a creepy, unwelcome familiarity. "Hi ya Normie," they greeted him. "Give my regards to your wife." A few women proposed an unsettling form of intimacy, offering their bodies in exchange for fuel. Other customers were subtler and more devious in their manipulations, such as those who disconnected their fuel gauges so that their tanks appeared to be empty. Many were downright aggressive, telephoning Reichbach incessantly, even at home, hounding him with their requests—their demands—for gasoline.3

The pressure rattled Reichbach, and he did not like what he saw in his customers or in himself. "My temper is short," he remarked. "I'm irritated easily. That's not my nature." Sometimes he just snapped. One day he noticed his wife in the line of cars. She was reluctant to cut in front of the other drivers, but he waved her ahead anyway. When a man behind her complained, he couldn't take it anymore. "Look, buddy," he shouted, "I sleep with her, not with you." Among all the behaviors that the beleaguered service station operator
witnessed, violence alarmed him the most. A driver attempted to make a right turn through the line that snaked from the pumps into the street. Motorists in the line mistakenly assumed that he was trying to cut in, and three of them leaped from their vehicles, fists clenched, ready to beat him. "Animals!" Reichbach exclaimed. "People get to be animals for gas."6

The gasoline shortage induced in Norman Reichbach an emotional and physical reaction that epitomized the modern condition: nausea. Surely he thought himself lucky that his house stood across the street from his service station. Unlike his customers, he did not have to burn fuel to get to work. Yet that proximity also prevented him from escaping the source of his distress. "When I get up and go into the bathroom to brush my teeth," he said, "I can see them lining up in their cars with their lunch and their thermoses, like they're going on an outing. And I get sick."7

Until 1973, Americans were unaware of how dependent they were on oil and its derivatives and how powerless they could feel when their tanks ran dry. Like Norman Reichbach and his customers, they took for granted the machines and the fuel that insulated them from the vicissitudes of nature and the wearisome challenges of movement across the landscape. For most people, the internal combustion engine and the automobile had symbolized all that was great and promising about the United States: material abundance, economic prosperity, technological progress, individual opportunity, and freedom of movement. But like Reichbach and his customers, they discovered that the mere slowing—not stoppage—of oil forced them to confront the underside of the American Dream.

In that shadowy netherworld, virtually every marker of national greatness had an alternate, ignominious face. Instead of inexhaustible abundance, Americans now experienced limits. Rather than endless prosperity, they coped with economic contraction. If they once foresaw boundless technological progress, they now reckoned with machines that made them weak and vulnerable. Instead of ambitious, optimistic, go-getting individualists, they turned out to be anxious, alienated, desperate creatures capable of behaving like animals. If the automobile symbolized the confidence of an era when gasoline was cheap and seemingly limitless, then the line of cars at the service station stood for its opposite, a time when doubt, anger, and fear—not dreams of unlimited prosperity—issued from the pumps.

The travails of Norman Reichbach and his customers belong to a much larger story, a "big history," centered on the system by which the United States tapped the flow of energy—often measured in light, heat, and motion—that defined the very form and function of the universe.8 By the twentieth century, the United States had increased its diversion of that flow by drawing oil from deep within the Earth and turning it into gasoline and diesel fuel at service station pumps. Composed of underground deposits, wells, pipelines, ships, refineries, storage tanks, railroads, highways, trucks, service stations, and the corporations and government agencies that ran them, the system poured oil into the U.S. economy, making the nation wealthy and powerful.

But in the early 1970s, at the very moment that U.S. oil consumption dramatically increased, the rate of extraction from the nation's domestic reserves peaked and went into decline. To make up for the deficit, the United States drew from overseas sources as never before. This reliance on imported oil left the nation vulnerable to manipulation by foreign governments. In October 1973, after the United States supported Israel in a war with Egypt and Syria, a group of Middle East countries retaliated against the nation with an oil embargo. The consequences were telling. As the vast system that linked ancient underground deposits to modern service station pumps shut down, incidences of frustration, manipulation, violence, and nausea shot up.7

The story of the oil shock of 1973-1974 would be important if it consisted only of shortage, embargo, and the resulting social and economic turmoil, but it has a deeper significance that speaks to the environmental basis of life in the United States and all other places. More than ever before, Americans had to confront the absolute limits of a crucially important energy source. Nature had not distributed oil uniformly or in unlimited abundance beneath the Earth's surface, and by the early 1970s, extraction within the geographical boundaries of the United States had begun to slow. Yet the energetic pinch that citizens now felt was the consequence not simply of finite reserves in American territory or of the nation's desire for foreign oil. The pinch of 1973-1974 was not just a national, transnational, or international problem—it was a manifestation of a universal law of physics that conditioned the existence of all living things.8

The 1973-1974 oil shock tested Americans' capacity to recognize this truth and modify their behavior accordingly. Did the nation and its citizens learn anything from the experience? If so, what did they learn? Did they act on those hard lessons? From the perspective of the lines of motorists at City Line Flying A and other service stations, the initial answers are troubling. All too often, the oil shock evoked Americans' propensity for selfishness, greed, deceit, denial, anger, and violence. Many people could not see or did not want to see past their
immediate concerns to the underlying causes of their predicament. They were too invested in oil to do otherwise.

Yet there is another side to the story, barely discernable at places like City Line Flying A. Not all Americans were helpless, mindless, self-absorbed victims willing to debase themselves for a few gallons of gas. In response to the crisis, many questioned their presumptions about the world and their place in it. A few tried to understand the environmental basis of what was happening to them, and some attempted alternative courses of action. It was difficult, if not impossible, for them to do anything without using oil, so heavily did they rely on it for food production, transportation, education, and myriad other economic, political, and cultural activities. Some tried to maneuver more freely within the system, and they recognized that cooperative behavior, not individualism and greed, furthered their objectives. Others sought to minimize their dependence on oil, if not break free of it altogether. A substantial number turned to the human body, a natural reserve once thought to be a major constraint on mobility. Of those Americans who opened themselves to the body’s energetic potential, perhaps some had waited in line at City Line Flying A. Perhaps Reichbach himself considered its possibilities when he walked across the street to his house. But whether or not he and his customers recognized bodies as an alternative energy source, bodies were abundant everywhere—as abundant, in fact, as oil was scarce.

Americans often showed the worse side of themselves in 1973–1974. Because the nation still is dependent on oil, it might be worthwhile to remember how its citizens behaved when they first realized that oil and automobiles were not necessarily the best means by which to conserve their liberty. Revisiting the past might reveal choices—if not exits—at every turn.

THE ENTRIC DRAMA OF THE UNIVERSE

The predicament in which Americans found themselves in 1973–1974 was the consequence of a cosmic condition that has bedeviled humankind from time immemorial. All forms of life, humans included, must capture a portion of the energy that flows through the universe. For the most part, living things do this by consuming other living things. In the abstract, the process seems straightforward. Grass absorbs sunlight. Cows eat grass. Humans drink cow’s milk, converting its calories into physical movement and body heat. In reality, energy capture and conversion are anything but simple. The flow of light and heat across the Earth is finite, uneven, and evanescent, and it has taxed the powers of humankind to divert and use even a fraction of it. When people figured out how to transform petroleum—oil—into gasoline and other fuels, they tapped the flow as never before. The fossilized remains of countless organisms, oil and coal powered the development of modern industrial civilization. But if the hydrocarbon economy enabled people to accomplish great things, it did not exempt them from the constraints that the flow of energy imposed. At no moment was this more obvious than during the oil shock of 1973–1974. Norman Reichbach’s nausea, it seems, was a telling register of humanity’s cosmic energy predicament.

The basic conditions for that predicament appeared at the beginning of the universe. In a scientific or historical sense, no one knows what came before. The primary origin of everything will remain a problem for philosophy and theology, not history. What matters to history is what happened at the inception of galaxies, stars, planets, and the rest—and what came afterward. This much is reasonably clear: from the start, the quantity of energy was fixed. No ultimate energy source, no giant furnace, would forever pulse fresh waves of light and heat into the darkness; the universe’s warmth was a one-time, one-shot proposition. The beginning was hot—very hot. From that moment onward, the flow was in one direction only, from higher temperature to lower. The shine of a star and the streak of a meteor, the rotation of a planet and the eruption of a volcano, the rush of a river and the crash of a wave—these and an infinite number of other physical motions dissipated heat from warmer conditions to cooler ones. Now known as entropy, the process never stopped or reversed. And its irreversibility pointed toward an inescapable conclusion. Eventually, at some distant moment, heat would dissipate until there would be no more hot and cold, but only a bland gray equilibrium—an undifferentiated mean—in which everything would be the same temperature. When the universe finally achieved its thermal destiny, all movements and struggles—all history—would cease.

Life became the tragic protagonist in the entropic drama of the universe, the beneficiary and prisoner of the gradient down which heat and time flowed. Between three billion and four billion years ago, on a lonely planet alternately bathed in light and shrouded in darkness, microscopic organisms appeared. Radiant energy from the nearest star, the sun, enabled those organisms to combine carbon dioxide, water, and minerals into the compounds that formed their tissues. Over eons, the process fostered an astonishing diversity of plants and animals, each capable of conserving a tiny portion of
the sunlight that washed across them. In effect, the carbon-based substance of each organism—a cell, a seed, or an egg, for example—served as a temporary energy reservoir, a fatty, oleaginous pool along the universe’s unstoppable journey toward its undifferentiated mean. Eventually, the energy in each pool became physical movement—the reservoir spilled its contents—and the flow of heat continued. The cell divided and became two; the seed germinated and a tree arose; the egg cracked open and a reptile emerged. Yet renewal, growth, and storage were only temporary, for no matter how cunning or artful the adaptation—no matter how deep the oleaginous pool—the outcome was inevitable. Sooner or later, every reservoir emptied. And at the end of time, reservoirs would be no more.

Until that moment, pools of energy accumulated and dissipated, alternately holding and releasing heat—or the potential for heat—as it rippled through the ages. One of the purest accumulations of energy was a hydrogen and carbon compound that formed beneath the Earth’s surface. Over millions of years, countless generations of organisms died and drifted down to oxygen-depleted zones on the ocean floor. One-celled aquatic plants called phytoplankton formed most of that rich benthic slime. Animal plankton that ate the phytoplankton also composed it, as did their excrement, the excrement of fishes, and odd bits of bird guano, dinosaur tissue, fish scale, gingko leaf, and anything else organic that reached the bottom before bacteria or plankton consumed it. Erosion added sand and mud to the gooey mixture, which, over additional millions of years, solidified into rock. Between seventy-five hundred and fifteen thousand feet below the Earth’s surface, intense pressure and moderate heat, about 150 degrees Fahrenheit, then slowly cooked the organic residue into oil. Viscous, slippery, and light, it gradually flowed upward into formations of sandstone and other porous rock, where it sometimes floated above remnant saltwater and below layers of dense, impervious stone or minerals. Some of it gradually seeped to the surface, where it occasionally gathered in pools that blackened in the air and under the rays of the sun.

The Earth’s living organisms mostly were indifferent to the oil in those pools. A few strains of bacteria developed the capacity to consume minute quantities of it. Larger organisms—insects and camels and saber-tooth cats—sometimes stumbled into the pools and died, their tissues merging with the energetic mass of the millions that had gone before. Eventually, a few humans discovered oil. Some used it as a salve or swallowed it in small doses, hoping to benefit from its medicinal powers. Others gathered it for fuel. In a humble smudge pot now lost to memory, a drop ignited, the reservoir opened, and once more the past flowed toward the future.

For millennia, people mostly ignored the hydrocarbon that oozed to the surface, for they were preoccupied by their pursuit of the more accessible and alluring oleaginous pools that surrounded them. They ached for those rich deposits, for the plump doe and fat cow, the juicy armadillo, chuckwalla, salmon, and conch, the greasy cricket and unctuous grasshopper. Some societies became unusually efficient at capturing the flow of energy, and they amassed extraordinary surpluses of calorie-laden substances: wheels of cheese and sides of bacon, piles of grain and slabs of wax, jars of olive oil and pots of honey, and bottles—endless bottles—of fermented drink. All of that concentrated energy served important purposes. It made possible an unprecedented degree of economic specialization and social differentiation, such that artisans, scholars, priests, bureaucrats, and soldiers could perform their duties unencumbered by the daily quest for food and warmth. The surplus, furthermore, energized political and military power, including the buildup of empires. Finally, caloric abundance fueled illusions characteristic of—perhaps necessary to—complex societies. Chunks of bread and trenchers of stew, not to mention tankard upon tankard of beer, deposited body fat and encouraged the belief—the faith—that the future would bring more of the same. And at night when the fire burned low and a chill settled over the room, the fat metabolized into heat, the body relaxed, and the mind gave flight to dreams.

For centuries, life went on like this. Yet the world was not in stasis. By the nineteenth century, demographic, environmental, and economic changes had intensified humanity’s hunt for additional pools of energy and the potential heat they contained. As the human population grew, the pools emptied. Near cities and on islands, entire forests went down, consumed in the fires of political and artful the adaptation—no matter how deep the oleaginous pool—the outcome was inevitable. Sooner or later, every reservoir emptied. And at the end of time, reservoirs would be no more.

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By excavating coal, humanity transformed the fossilized past into a revolutionary present. With their picks, shovels, cutters, and blasting powder, miners liberated the energy packed into dense seams of ancient ferns, horsetail, club moss, gingko, and pine. Although the fallen and flattened vegetation no longer could spring to life, it retained the capacity to burst into flame—in the fireboxes of steam engines, the furnaces of power plants, and the stoves that warmed the homes and bodies of people across the land. No longer were humans entirely dependent on each day’s sunlight and the plants and animals that is invigorated. Now they tapped the energy reservoirs of bygone times. The world would never be the same.

If coal started the hydrocarbon revolution, then oil perfected it. By the 1890s, chemists had figured out how to create illuminating fuels—collectively known as kerosene—from coal and from the liquid hydrocarbon that seeped from cracks in the ground. No one knew much about the vast petroleum reservoirs from which those seeps or “springs” issued. In some places, common knowledge had it that “rock oil” was merely the liquid residue, the drippings, of coal beds. Some entrepreneurs thought differently and hired well drillers to find oil. In 1859, along Oil Creek near Titusville, a poor timber community in northwestern Pennsylvania, William A. “Uncle Billy” Smith and his sons, working for Edwin L. Drake, erected a wooden derrick for their drilling apparatus. Using a steam engine, they drove their bit into the Earth and at a depth of only sixty-nine feet found what they were looking for. Then they pumped the oil into barrels once used for holding another kind of energy-packed liquid, whiskey. As word spread, land values around Titusville skyrocketed and whiskey barrels grew scarce. The world’s first oil boom was on. A vast planetary pool began to empty.

A series of strikes in the southern and western United States dramatically increased the flow of oil into the nation’s expanding economy. Ohio, Indiana, Illinois, Kentucky, Virginia, and Louisiana all experienced booms, but the largest and most important discoveries were in Texas, Oklahoma, and California. One of the richest and most famous oil fields was the storied Spindletop in northeast Texas, located on a dome of ancient salt that capped an immense hydrocarbon reserve. Opened in 1901, Spindletop encompassed all of 170 acres, slightly more than one-quarter of a square mile. Those 170 acres were productive beyond belief. The first six wells yielded more oil than the world’s other wells combined. One 75-acre area alone bristled with some 200 derricks, the legs of which overlapped because they stood so close together. By the end of 1904, roughly 400 structures clustered on the Spindletop patch; by 1904, the number had grown to approximately 1,200. Because geological forces subjected the underlying oil to intense pressure, pumping was unnecessary. Promoters impressed investors by opening wells and sending “gushers” an estimated 75 feet into the air. Much as tourists gathered around Old Faithful Geyser in Yellowstone National Park, so onlookers came to Spindletop to witness the sublime spectacle of the gushers. In September 1901, 12 open wells delighted a crowd of perhaps 15,000 people.

The sudden release of this enormous natural abundance gave rise to new corporations of unprecedented power and size. Standard Oil dominated the Pennsylvania fields and by 1879 owned 90 percent of the nation’s refining capacity. To its competitors and to antitrust reformers, the corporation became a hydra-headed monster that used ruthless and unscrupulous business practices to dominate the industry. The legal effort to break it down, however, merely recreated the beast in new forms: Standard Oil of New Jersey (later Exxon), Standard Oil of New York (Mobil), Standard Oil of California (Chevron), Standard Oil of Ohio (Sohio, later the American arm of British Petroleum, later BP), Standard Oil of Indiana (Amoco), Continental Oil (Conoco), and Atlantic Richfield (ARCO). Gulf, Sun, Texaco, Shell, Unocal, and other corporations soon appeared, each the creature of a field from which it channeled petroleum into the homes, farms, factories, and machinery of a restless nation.

By the early 1900s, less of that rich flow went into illumination than into the nation’s expanding transportation network. The development of electrical generation and transmission systems enabled increasing numbers of people to substitute light bulbs for kerosene. Much of the Spindletop output, furthermore, was thick and heavy and best suited for stoves and steam engine fireboxes, not lamps. Most important, the sheer volume of Spindletop oil and its consequent rock-bottom price made it an ideal source of mechanical power. In 1901, a barrel of Spindletop crude—44 gallons—sold for three cents, a price that encouraged the conversion of railroad and steamship transportation networks from coal to oil. In 1901, the Santa Fe Railway operated one oil-burning locomotive; by 1905, it ran 227. A massive shift in the industrial system of the United States had begun.

The shift to oil continued with the development of refining processes that made possible the production of a light fuel necessary to the internal combustion engine. In 1908, Henry Ford introduced the prototype Model T. At that time, oil refineries manufactured gasoline by distillation. Workers heated
crude oil in a large vertical cylinder called a distillation tower. As the different molecular components of oil reached their boiling points and vaporized, they passed into pipes. When the vapors cooled, they condensed into their distinctive liquid forms, one of which was gasoline. At most, distillation transformed 20 percent of each barrel of crude oil into the fuel. William Burton, a chemist with Standard Oil of Indiana and the holder of a Ph.D. from Johns Hopkins University, set out to increase the proportion. In 1909, he and his assistants introduced thermal cracking. By subjecting crude oil to extremely high pressure and temperature—650 degrees Fahrenheit or more—they fractured or “cracked” the oil’s long chains of carbon molecules, thereby turning as much as 45 percent of each barrel into gasoline. During the late 1930s, catalytic cracking—the use of mineral catalysts to hasten the cracking process—further improved production.

The torrent of gasoline that poured from the refineries fueled an ever-expanding fleet of vehicles, the majority of which traveled on paved, all-weather streets and highways. In 1919, Americans operated some one million registered automobiles. By 1920, they drove about eight million, and by the end of the decade, the number increased to approximately twenty-seven million. During the 1920s, farmers purchased approximately 830,000 tractors, displacing millions of horses and bringing the hydrocarbon revolution to the rural landscape. A growing network of improved roads helped launch the United States into the auto-industrial age. The Federal Aid Road Act of 1916, the Federal Highway Act of 1921, and gasoline sales taxes imposed by the states paid for a highway system that, by the 1930s, extended some 407,000 miles.20 Although gravel, brick, and concrete composed many miles of pavement, an increasing proportion of the total—eventually more than 90 percent—was made from asphalt, the thick, sticky tar left over from fuel manufacture. Much of the nation’s early highway asphalt came from the area that first opened the country to the transportation possibilities of oil. In 1920, Port Neches, Texas, just down the road from Spindletop, boasted “the largest asphalt refinery in the world.”

Americans soon developed powerful attachments to the machines that tapped the world’s ancient petroleum reserve. During the 1920s, Robert and Helen Lynd, a husband-and-wife team of sociologists, carried out a study of life in Muncie, Indiana, a place they called “Middletown.” In effect, the Lynds went to Muncie and took a snapshot of America. Some of their findings offered striking insights into the social changes that were transforming the nation. Their surveys and interviews, for example, revealed that community members placed an exceptionally high value on automobiles. For many people, the new technology was not a luxury but a necessity, and they were willing to pay for it. A number of families had mortgaged their homes so that they could purchase their vehicles. For others, the potential sacrifices were even more basic. “We’d rather go without clothes than give up the car,” one woman asserted. “I’ll go without food before I see us give up the car,” said another.21

Muncie residents used their vehicles for various purposes, but increasingly for recreation and leisure, especially trips in search of undeveloped rural nature. Many went on Sunday drives away from the town, and those who could afford annual vacations often enjoyed automobile excursions into the countryside.22 That kind of travel was becoming a national trend. By the 1920s, growing numbers of Americans were going “back to nature,” and state and federal government agencies—the National Park Service and others—assisted them by building roads through forests, mountains, seashores, and other beautiful landscapes. Tourists thus participated in a broad pattern of economic activity and geographic movement that refashioned America along hydrocarbon lines. Because of oil fields such as Spindletop, the people of Middletown could enjoy relatively untrammeled places like Yellowstone.23

Given this history of oil strikes, pavement, and automobile enthusiasm, it is tempting to imagine that the adoption of the internal combustion engine and the gasoline that it burned were inevitable to the development of the United States. It is easy to conclude that the people who claimed they would give up clothing and food before abandoning their cars were the direct progenitors of the anxious consumers who waited in line for hours at Norman Reichbach’s service station.

Such a view of the past is not necessarily wrong—Middletown consumers who saw their cars as necessities did anticipate later Americans who formed long lines at service station pumps. It would be a mistake, however, to conclude that automobiles and oil were as ineluctable as they now might seem. The triumph of gasoline-powered motor vehicles obscured other roads that Americans might have followed into the future. By 1973–1974, most people had forgotten—if they ever knew—that some of their predecessors had resisted incurring the debt necessary to buy automobiles. “No sir, we’ve not got a car,” one Muncie citizen told the Lynds. “That’s why we’ve got a home.”24 And most Americans who waited in line for gasoline during the early 1970s oil shock had forgotten—if they ever knew—that oil had been only one among several energy reservoirs from which earlier citizens had drawn.
Well into the twentieth century, the future of automobiles and hydrocarbons was not settled. Animal power, which tapped the flow of solar energy that passed through forage and into the guts and muscles of horses, remained widespread. Nationally (and globally), the number of draft animals peaked in about 1920. As late as the 1930s, milk and other commodities came to the doorsteps of consumers by horse-drawn wagon. And despite the massive adoption of tractors during the 1920s, horses did not completely disappear from farms until after the Second World War. Human muscle power also remained important; solar energy that flowed through plants and animals eventually made its way into the bodies of people, most of whom still walked an extraordinary number of miles. Many Americans also applied muscular effort to bicycle pedals, an efficient and healthy means of converting food into mechanical power. Bicycling became popular during the late nineteenth century, and bicyclists were the earliest and most vociferous proponents of paved roads. By 1915, Americans owned some six million two-wheelers—more than the number of cars.

Nor was oil fated to be the only source of automobile energy. Until the 1930s, oil refineries faced competition from companies that produced fuel from plants. The early diesel engine ran on peanut oil, not petroleum, and gasoline engines ran well on alcohol derived from fermented vegetable matter. Distillers filled large racks with plant material such as grain, potatoes, sugar beets, and molasses. Yeasts and other microorganisms consumed starches and sugars in the “mash” and in the process exuded alcohol. Distillers then heated the mash, vaporizing the alcohol and driving it into tubes, where it cooled and condensed into its purified form. By the early twentieth century, alcohol appeared to have great promise as an illuminant and engine fuel. In 1916, President Theodore Roosevelt signed into law a measure repealing an alcohol tax that had been imposed forty-four years before to help pay for the Civil War. Alcohol suddenly was much cheaper. Huge crop surpluses and a growing market for fuel in Europe made its prospects even brighter.

Perhaps alcohol’s greatest advantage was that petroleum supplies were so uncertain. In keeping with energy’s universal limit, every oil field, even the vaunted Spindletop, proved finite. Growing numbers of oil-burning engines, including those used by the armies and navies of the First World War (1914–1918), soon reduced the glut. Yet consumption alone did not account for depletion; so did waste. Gushers impressed investors and onlookers, but well owners could not recover the oil that sprayed across the Texas sky. Spectacular fires matched the sublime spectacle of the gushers. One Spindletop conflagration destroyed sixty-two derricks and sent flames a thousand feet into the air. Much of the waste resulted from a legal principle that governed early oil extraction. According to the “rule of capture,” oil from a common underground pool belonged to those who pumped it out, and drillers spilled huge volumes in their pell-mell rush for the valuable substance. Rather than directing the flow into pipes, tanks, and impervious reservoirs, for example, they channelled it into unlined earthen ditches and catchments. The losses were staggering. The geologist Wallace Pratt later estimated that producers squandered some 75 percent of the oil and natural gas they discovered. Anthony Lucas, who drilled the first Spindletop well, referred to another kind of oleaginous pool when he explained what had happened. “The cow was milked too hard,” he said, “and she was not milked intelligently.”

The reaction to depletion took different forms, including conservation, exploration, and more attention to alcohol. In 1910, Congress authorized the president to withdraw from development oil and coal lands in the American West. Much like national forests, below-ground petroleum reserves would conserve a finite natural resource of enormous value to the nation. By 1916, presidents had created fifty of them, and they had designated some, such as Teapot Dome Reserve No. 3, as strategic supplies for the U.S. Navy. Federal policy did not end with conservation; however, during the 1920s, the State Department encouraged oil companies to search for oil deposits abroad. In the meantime, popular and corporate interest in fuel alcohol increased. In 1925, no less than Henry Ford predicted that alcohol would be “the fuel of the future” and would be made “from fruit like that sumac out by the road, or from apples, weeds, sawdust—almost anything. There is fuel in every bit of vegetable matter that can be fermented.”

Other automobile producers shared Ford’s interest. During the early 1920s, three engineers at General Motors (GM)—Thomas Midgley, T. A. Boyd, and vice president of research Charles Kettering—conducted extensive analyses of the fuel. They concluded that it could serve as a partial, if not complete, substitute for oil, which they believed must come, some day, from foreign sources. They also recognized that alcohol could alleviate a technological problem that was inherent in engines larger and more powerful than the first models. When an engine piston compressed the air and fuel mixture in a cylinder, the mixture often exploded instead of burning evenly. This premature, incomplete combustion wasted fuel, reduced engine power, and caused a distinctive and
troubling sound, called engine knock. Engineers such as Midgley, Boyd, and Kettering learned that gasoline composed of highly branched hydrocarbon molecules—high-octane gasoline—would cause extreme compression, burned more efficiently, and did not cause engine knock. They also discovered that certain compounds dissolved in gasoline increased its octane level and anti-knock properties. One of those compounds, they found, was alcohol.

Yet the "fuel of the future" never achieved its promise. For one thing, it had significant drawbacks. Gallon-for-gallon, alcohol contained perhaps 30 percent less energetic potential than gasoline. Manufacturing it, furthermore, required significant quantities of energy. To harvest and transport plant matter, farmers had to burn fuel or metabolize the calories in animal fodder. Distillers then had to heat the mash with fuel, perhaps coal or oil. In the end, alcohol might not have yielded as much energy as was necessary for its production; it might have entailed, in short, a net loss.

But there was another reason the alcohol future never arrived. In 1921, at the very moment he was experimenting with alcohol, Thomas Midgley discovered that a form of lead—tetraethyl lead—raised the octane level of gasoline. In concert with the DuPont Corporation and Standard Oil of New Jersey, GM touted tetraethyl lead as the least expensive, most efficient octane enhancer available. GM then joined with Standard Oil to create the Ethyl Corporation, which manufactured the compound. Tetraethyl lead imposed an enormous environmental and economic cost on American society. The microscopic particles of dull gray metal sickened factory workers and, when spewed from automobile tailpipes, damaged the nervous systems of children and contributed to a public health disaster that went unmitigated for some five decades. During that time, GM and its corporate allies downplayed, suppressed, or disputed information on the benefits of alcohol and the detriments of lead.

One final factor ensured alcohol's demise. By the end of the 1920s, the oil shortage turned into an oil glut. Major discoveries in Oklahoma (1927) and California (1928, 1929) flooded the market with the substance. Then, in October 1930, a shabby old wildcatter named Columbus "Dad" Joiner sank a well on the east Texas farm of Daisy Bradford. Geologists laughed at Dad Joiner, and one critic (a Texaco employee) boasted that he would drink every barrel from Daisy Bradford No. 3. The gusher that roared out of the hole proved the geologists wrong. A vast new oil field—the Black Giant—soon encompassed 145,000 acres and some 3,500 wells that eventually yielded 7 billion barrels. The largest field discovered in the lower 48 states, the Black Giant drove prices to rock bottom levels. Oil that had sold for $1 per barrel in 1919 fell, by late May 1931, to $0.15, then to $0.06, and finally to $0.02. The British economist John Maynard Keynes later observed that the crisis of American capitalism was one of abundance, not poverty. The deeply distressed prices of May 1931 underscored his point and revealed in stark detail the oleaginous face of the Great Depression. Alcohol could not compete against the hydrocarbon surplus that engulfed the nation's service stations. The future belonged to oil.

In reaction to the price collapse, the United States installed a regulatory system that maximized the economic benefits of its petroleum superabundance. As prices tumbled, Oklahoma, Texas, and other oil-producing states replaced the rule of capture with a regulatory program called prorationing.

By restricting the daily output of each well, prorationing slowed depletion, kept oil off the market, and thereby boosted prices. The Texas Railroad Commission (T&RC) became the most celebrated practitioner of prorationing. Founded in 1891 to oversee railroad rates, the T&RC managed oil pipelines during the First World War and, in the 1920s, determined the spacing of wells. Those policies anticipated prorationing, which the T&RC instituted in 1931 and 1932. Oil regulation was not limited to state agencies such as the T&RC, moreover. In 1932, Congress imposed a tax on imported oil and fuels, a policy that protected domestic producers. Three years later, it prohibited the shipment of nonprorated petroleum across state lines and established the Interstate Oil Compact Commission to coordinate prorationing. The state-federal regulatory system served its purpose. The price of oil soon rose above $1 per barrel and remained there for the rest of the decade.

The flow of liquid hydrocarbon—and government regulation of it—increased over the next three decades. Major discoveries during the 1940s and early 1950s added to the magnificent finds of the 1930s. In 1948, for example, drillers opened ancient ocean reefs below Scurry County, Texas, and began to extract a pool that eventually amounted to some two billion barrels. Twenty years later, Atlantic Richfield (ARCO) stumbled on an immense field of some nine billion barrels—the largest in American history—at Prudhoe Bay on Alaska's North Slope. Numerous wells off the Pacific and Gulf coasts augmented the total. Oilfield workers—drillers, roughnecks, roustabouts, geologists, and engineers—revelled in the abundance. "We're cuttin' up a fat haw," they often said, evoking the culture of the Texas and Oklahoma oil patches. The richness was great, and the United States took additional steps to shield it from a worldwide glut that drove down import prices and undercut the domestic market. In
1959, President Dwight Eisenhower imposed an import quota pegged at 12.2 percent of U.S. demand. He might have allowed more foreign oil into the country, which would have closed domestic wells and conserved the nation’s deposits, but he and his advisers, believing that national security required those wells to be in operation, decided against it. In consequence, domestic oil gushed forth as never before.40

America’s natural petroleum bounty transformed the nation and its fortunes. Some six billion barrels fueled the World War Two struggle (1941–1945) against Germany and Japan. During the Cold War (1945–1989) and the conflicts in Korea (1950–1953) and Vietnam (1964–1975), the United States continued to mobilize its petroleum reserves to build military power. Domestically, oil profoundly altered life and landscape. By 1945, the number of cars stood at some 25 million, and within five years the figure had risen to 54 million. In 1965, three years after Norman Reichbach opened City Line Flying A, the count was 75 million, and by 1968, the total had climbed to 100 million. This vast fleet enabled—and benefited from—the 1956 Interstate Highway Act, which used revenue from a gasoline tax to construct some 41,000 miles of freeways. Many of those miles encouraged housing construction on the urban fringe, until by 1960, more Americans lived in suburbs than in cities. Virtually every suburban dwelling had a lawn that was regularly trimmed by a gasoline-fueled mower. From the B-52 bombers that patrolled the skies to the grass on which children played, twentieth-century America became a fully petroleum-powered, automobile society.41

The intensive use of oil profoundly shaped social relationships and culture in the hydrocarbon nation. The mass migration to auto-dependent suburbs reinforced a powerful gender ideology that idealized women as homemakers—as wives and mothers centered in single-family dwellings and oriented to domestic routines in which they drove to shopping centers, Tupperware parties, Parent-Teacher Association meetings, and, with their children, Little League games and music lessons. A rising level of affluence, itself a function of increased petroleum use, gave husbands and wives a level of economic security that encouraged them to produce some seventy-five million children between 1946 and 1964. Most Americans probably did not draw a connection between the nation’s energetic basis and the baby boom, but the demographic surge indeed was underwritten in oil. The popular culture of the growing boomers said as much. In "409," "Fun Fun Fun," "Little Deuce Coupe," "Surfin’ Safari," and other songs, the Beach Boys, one of the most popular rock and roll groups of the early 1960s, celebrated the joyful liberation that gasoline and internal combustion engines bestowed on California’s sun-splashed youths.42

Yet in the midst of this vast environmental, economic, and social transformation—a transformation of world-historical significance—problems appeared. The flow of oil, the ostensible means of American strength, also proved to be a source of weakness. Some of that weakness was measured in environmental consequences. From its inception, oil extraction polluted the nation’s waterways and coastlines. In December 1862, for example, ice in a Pennsylvania stream broke apart 150 oil boats, spilling the contents of some thirty thousand barrels. By the mid-twentieth century, such spills were commonplace. Oil use also sent pollutants into the air. As early as the 1940s, the inhabitants of Los Angeles noticed a yellow-brown haze that stung their eyes. Their circumstances gradually worsened until, in 1962, they reported eye irritation on 243 days. The source of their discomfort was the combustion of gasoline in their automobile engines, which yielded chemical compounds—nitrogen oxide, carbon monoxide, ozone, and others—that inflamed eyes, bronchial passages, and lungs. Lead particles added to the national pollution problem by damaging the mental capacities of children—especially poor children who lived close to streets—and depriving society of their intellectual, social, and economic potential.43

Social problems accompanied the harmful biophysical consequences of increased petroleum use. In 1945, a group of discharged California men, some of them World War Two veterans, formed the Hell’s Angels, a notorious outlaw motorcycle gang as “tough, mean, and potentially dangerous as packs of wild boar,” according to journalist Hunter Thompson. Feelings of profound unhappiness, alienation, and boredom plagued the nation’s young people, revealing a dark underside to the golden youth depicted in Beach Boys music. In Rebel without a Cause (1955), James Dean played a sullen teenager fed up with his parents and other authority figures and for whom automobiles became instruments of mischief and rebellion. Dean’s real-life death in a car crash only heightened the popular appeal of his celluloid persona. Frustration and unhappiness similarly began to overtake women who were supposed to be happy suburban housewives. In The Feminine Mystique (1963), Betty Friedan argued that suburbs were “comfortable concentration camps” in which women confronted “the problem that has no name,” the tension between their desire for personal fulfillment and the deadening reality of their domestic roles. Friedan and other women were not alone in feeling trapped. Hindered by pervasive discrimination, few...
African Americans migrated from cities to suburbs, and fewer still found jobs with the corporations that concentrated on the urban fringe. As their incomes fell, the municipal tax base collapsed, and schools and other infrastructure crumbled, they grew angry and bitter.65

No less worrisome than such environmental and social problems, new discoveries of petroleum only delayed the moment of reckoning when the nation's military and economic expansion would outstrip the capacity of its reserves. None of the later discoveries matched the overall quantity of the 1930s finds, and none kept up with consumption. The Second World War burned an amount of oil equivalent to the Black Giant, and the Vietnam War expended another five billion barrels, canceling a good portion of the Prudhoe Bay find. Much of what remained ended up in cars and trucks. Overall, the use of oil and other energy sources doubled between the 1950s and 1970s, a rate far in advance of the nation's population growth.46

A few petroleum experts recognized that the fat was dissipating and the country was headed for trouble. Among them was a scientist named M. King Hubbert. A native of Texas, Hubbert had a Ph.D. in geology from the University of Chicago and worked for Shell Oil at its research laboratory in Houston. In 1956, the same year Congress passed the Interstate Highway Act, he made a startling prediction: in the near future, U.S. oil production in the lower forty-eight states would cease growing—it would peak, in other words—and then decline forever. Using statistics on past production and proven reserves, he calculated a total domestic supply—the amount that nature created and Americans had the means to get—of 130 billion to 200 billion barrels. By extrapolating from the rates of discovery and extraction, he then determined that at some moment between 1965 and 1972, the cumulative amount pumped from the ground would reach half the grand total. After that, the rate of extraction would fall, and rising consumption would strain against increasing scarcity. Minutes before he presented his findings to a meeting of the American Petroleum Institute, Shell officials telephoned and asked him to reconsider. A stubborn, curmudgeonly man, he refused.46

Events proved Hubbert correct. In 1970, U.S. oil production peaked at nine million barrels per day and then went into permanent decline. The following year, the Texas Railroad Commission announced that it would allow wells to be pumped at 100 percent of their capacity. In 1972, the commission ended production rationing altogether. By then, the domestic market was absorbing all the petroleum the nation's wells could deliver, and then some. For his efforts, Hubbert became a hero to conservationists and other people who demanded that the United States face up to the dangers of its petroleum consumption. Their esteem only increased when he made another controversial prediction: worldwide production would peak early in the twenty-first century.48

What made Hubbert's peak especially unsettling—and what made it a potent of vulnerability—was that the increasing consumption that caused it also compelled the nation to rely on imports. By accidents of geological and political history, other countries—Canada, Mexico, Venezuela, and the Soviet Union, for example—had world-class deposits of oil. So did countries in the Middle East, especially those bordering the Persian Gulf. Kuwait had the immense Burgan field, discovered in 1938, which contained some seventy billion barrels. No nation on Earth, however, matched Saudi Arabia's endowment. The showpiece of Saudi oil, the basis of the kingdom's economy and the means of its political power, was the fabulous Ghawar field. Discovered in 1948, it held a gargantuan, eighty-seven billion barrels. And not only were Ghawar and other Persian Gulf fields of enormous size, but they also boasted the finest—the most easily refined—light sweet crude.49 In 1970, the United States imported some 483 million barrels of crude oil, about 12 percent of the total available to the nation that year; in 1973, the figure rose to 1.85 billion barrels, about 26 percent. Although Canada and Venezuela contributed most of the imported petroleum, an increasing proportion came from the Middle East. In 1970, Saudi Arabia and other Middle East states supplied some 18 percent of the oil imported to the United States, and three years later, they furnished roughly 42 percent.50

By that time, Saudi Arabia and its allies had attained an influential position in world and U.S. oil markets. Saudi Arabia's entry into the petroleum age had begun in 1938, when Standard Oil of California (Socal, later Chevron) set up the California-Arabian Standard Oil Company (Casoc) to extract Saudi petroleum and return some of the proceeds to the kingdom. In 1936, the Texas Company (later Texaco) acquired an interest in Casoc, and Socal and Texas created Caltex to help market Saudi oil, commercial quantities of which Casoc struck in 1938. In 1944, Casoc became the Arabian American Oil Company, known as Aramco. Three years later, Socal and Texaco admitted Standard Oil of New Jersey (Exxon) and Socony-Vacuum (Mobil) into Aramco, and in 1950, the participants began to split profits fifty-fifty with the Saudis. Yet the world glut and falling prices had disappointed the Saudis and other exporters, and they decided to take action. In 1960, two years before Norman Reichbach opened his Yonkers service station, representatives of Kuwait, Iran, Iraq, Venezuela, and
Saudi Arabia met in Baghdad to form the Organization of Petroleum Exporting Countries, or OPEC. Like the Texas Railroad Commission, OPEC sought to match production with demand as a means of boosting prices and profits. Within a decade, the organization was poised to exert considerable leverage on the United States. In April 1973, President Richard Nixon ended the import quotas. Demand surged ahead of domestic production that summer, and lines appeared at Norman Reichbach’s service station and others across the country. Saudi Arabia and the other OPEC members had the spare capacity that the United States lacked, and they knew this gave them unprecedented power.

They wielded that power in October. The pretext was a war between Israel and two of its neighbors, Egypt and Syria. The United States had supported Israel since 1948, the year that Jewish refugees, settlers, and intellectuals founded the state—and the same year that geologists discovered the Ghawar field in Saudi Arabia. Israel and surrounding Arab nations had battled each other several times over territory, the plight of Palestinian Arabs under Israeli occupation, and Israel’s very existence. In early October 1973, in an attempt to regain territory lost in earlier conflicts, Egypt and Syria attacked Israel. When the Soviet Union sent military supplies to the Arab combatants, the United States rushed war materiel to its ally. In retaliation, OPEC raised the price of crude from $3.00 to $11 per barrel. Days later, Saudi Arabia and the other Arab OPEC members embargoed petroleum shipments to the United States. Domestic prices spiraled upward; oil that had sold for $2.90 per barrel before the embargo reached $11.65 in December. Prices at the pump rose accordingly. A gallon of gasoline that cost $0.27 in September reached $0.51 and higher by the end of the year.

The fortunes of the United States shifted with the flow of energy. The nation had enjoyed a privileged position along the entropic channels that ran through the universe. More than the borders of most countries, America’s had encompassed substantial underground pools that contained the radiant energy of ages past. In combination with other resource endowments, the United States had used its oil to transform itself into a global superpower. Like all pockets of oleaginous wealth, however, the nation’s oil deposits inevitably emptied. As M. King Hubbert noted, the “flux of energy” that passed through Earth was “unidirectional and irreversible.” Eventually, tectonic forces would have opened fissures from which the oil surfaced. At those places, the environment would have absorbed the slippery substance, drop by precious drop. The outcome that nonhuman nature would have accomplished in millions of years, human nature achieved in about a hundred. In automobiles and other devices, the fossil soup momentarily flared, mechanical parts moved, and residual heat dissipated in the passage of time. Meanwhile, people in other countries tapped bigger, better pools and laid claim to greatness.

Questions remained. How would the nation respond to the oil shock? Would people everywhere degenerate into selfishness and despair, as they did at Norman Reichbach’s City Line Flying A, squabbling and fighting over what little remained? Or would they question their assumptions about the world and adopt a different, more durable scale of values? Would they devise alternative ways of living and perhaps even turn to other energy sources and technologies?

Give me gas or I will kill you

Service station operators everywhere had much less gasoline than usual during 1973-1974. Some, like Norman Reichbach, regulated the flow by limiting the quantity of each sale, restricting the days and hours of business, or favoring
well-known and trusted customers. Others pumped freely and then simply closed when their underground storage tanks ran dry. Across the nation, hand-lettered “out of gas” signs became common. As opportunities to purchase fuel diminished, the “gas line” became the symbol of a disorienting new reality. Customers often found themselves at the end of a line of maybe five or six vehicles, but those relatively short backups could grow to dozens of cars. At their most extreme, the queues attained staggering lengths. At one New York City service station, attendants counted 235 vehicles. At Ocean City, New Jersey, one motorist pulled over to wait for gas four miles from the pumps. Elsewhere, drivers waited for two or three hours to be served. No matter the length of the line, idling automobiles used enormous quantities of fuel. Consumers’ Union, a nonprofit research and advocacy organization, calculated that a mile of six-cylinder engines burned 350 gallons every hour.\(^{54}\)

Patience and civility vaporized along with the hydrocarbons. Service station owners and employees were not above using the situation for their own gain. A callow teenage attendant told a woman from New Jersey that she never need want for gasoline if she would “put out.” Unscrupulous service station operators gouged their customers. In Chicago, motorists accused an owner—also a policeman—of a crass deception: he would give them gasoline for free, but only if they purchased mundane items—bars of soap, containers of all-purpose cleaner, rabbits’ feet, standardized forms for wills, and the like—at prices that exceeded the value of the fuel. Other gasoline sellers were more straightforward—and underhanded—in their duplicity. On Long Island, a service station tricked customers by filling their tanks with less fuel than the amount indicated on the pump.\(^{55}\)

But more often, service station owners and employees, Norman Reichbach and thousands more like him, had to cope with customers who seemed ready to do virtually anything for fuel. “People are trying all kinds of tricks to get in front of the line and get more gasoline,” reported Haim Levi, a station owner in New York City. “Most of them have to go to the hospital, their wives are sick, they’re about to have a baby. I never heard of so many babies being born and the husbands don’t have gasoline.” Some motorists went beyond mere pleading, cajoling, or lying. In Stamford, Connecticut, a woman with Virginia license plates offered to exchange sex for gasoline. The station owner declined, but sold her a few gallons anyway. Other customers took more aggressive action. Some cut into line, drawing the ire of the people behind them. A few behaved like petulant children. A man in New York cut in front of a line and then locked himself in his car and refused to move until the station served him. Twenty minutes later, the police finally dislodged him. Another man who had appropriated a spot at the head of the line ran into the restroom and flushed his keys down the toilet. Still another clung to a gasoline hose while attendants struggled to pull him away.\(^{56}\)

The stress led to harassment and threats. Motorists in Florida cursed and insulted station owners and their employees. In Armonk, New York, a woman swore at an attendant and said that he lied when he told her the station had no gasoline. At Boopsie’s Shell Station in Albany, a small, elderly woman, angry for being denied fuel, reached for a can of oil with which to hit the proprietor, George Rickert. Her threat was mild in comparison with what happened elsewhere. In Springfield, Massachusetts, “a huge bear of a man” walked into a service station and told the dealer, “You are going to give me gas or I will kill you.” Angry motorists in other places confronted owners and their employees with knives, pistols, hand grenades, and worse.\(^{57}\)

Some people turned to outright robbery, which they often carried out under the cover of darkness. In Salinas, California, thieves pumped eight hundred gallons from the underground storage tank of station owner Raleigh Alston. “No one would give a second thought to seeing a gas tanker at a service station in the middle of the night, would they?” observed a police officer. Further south, in Pasadena, men armed with shotguns hijacked—or “gasjacked”—an ARCO truck when its driver arrived at a service station to make a midnight delivery of fuel. Two of the bandits bound the driver and dropped him off in a nearby town. Police found his tanker an hour later, devoid of its eighty-five hundred gallons.\(^{58}\)

Service station operators and pump attendants shared Norman Reichbach’s resentments. “I don’t like my customers taking their frustrations out on me—threatening to kill me or to burn down the station,” said Patrick Bellegrazie, a Texaco dealer in Evansville, Illinois, north of Chicago. “They’re out of their minds, they’re turning sick,” said Alvin Garafola, co-owner of Marine Park Sunoco in Brooklyn, New York.\(^{59}\) “They’re worse than animals,” complained one pump attendant. “The public is behaving like animals,” railed another.\(^{60}\) Joseph Cautela, a therapist in Natick, Massachusetts, agreed that something had changed in the minds of many drivers. “People see gasoline now in terms of basic survival,” he said. “Whenever you have anything with that kind of value on it, people are going to fight for it. They do things they ordinarily would not do.”\(^{61}\)
To protect themselves, some service station owners and attendants began carrying firearms. In tiny Monument, Colorado, north of Colorado Springs, Morgan Porter served his regular customers ahead of the tourists who passed through on their way to see the nearby Rocky Mountains. Some of the vacationers didn’t like the favoritism, and they expressed their sentiments in no uncertain terms. To “emphasize his seriousness,” Porter “strapped a pistol on his hip.” Although such firepower no doubt discouraged some aggressive customers, tragic gunplay also ensued. At a gas station in New Orleans, Earl Richardson protested when told that he could buy only $3 worth of gasoline. When he appeared to reach under his coat for a weapon, the pump attendant, Charles Russ, shot him to death.61

Chaos and violence spread beyond the service stations. As gasoline became scarcer and more expensive, stealing increased. During the night, thieves used siphons and pumps to drain the contents of automobile fuel tanks. In the morning, surprised and angry motorists headed to auto supply stores to purchase locking gas caps. Perhaps the most tragic oil shock stories concerned people who loaded up with extra gasoline and then paid dearly for it. A young Pennsylvania man filled storage cans with fifteen gallons and put them in his vehicle. He came to a fiery end when he skidded off the road and his portable reserve exploded. In Connecticut, another man burned to death when he rammed a guardrail on the Merritt Parkway, igniting the three gallons of gas that he carried in his car.63

Explosions, gunfire, fistfights, and other dramatic events captured popular attention, but motorists also experienced the oil shock in mundane ways. Many people quietly endured frustration, anger, disappointment, confusion, or bodily discomfort as they waited in line or curtailed trips. In Michigan one weekend, Jim and Nadine Hunt did not have enough gasoline to visit their newborn son in the neonatal intensive care unit of a distant hospital. Local service stations that might have sold them fuel were closed for the weekend. The Hunts had no recourse; they simply had to wait until Monday. In Fremont, California, Jared Orsi, a boy perhaps three or four years old, sat in the back seat of a Ford Galaxy and tried to quell the growing pressure in his bladder. The squirming youth understood that purchasing gasoline was difficult and time consuming, and he worried that a trip to the restroom might cause him and his parents to lose their place in line. Should he say something? Or should he try to hold it?64

The problems rippled throughout the nation’s economic system. Rising prices at the pumps took a greater share of paychecks and threatened the jobs of automobile commuters and small businesses that relied on vehicles. Consumer goods of all kinds cost more, further cutting into personal capital. Citizens who had moved to distant suburbs wondered if they had made the right decision. Wives and mothers responsible for grocery shopping and transporting children worried about household budgets as money disappeared into the tanks of enormous station wagons that averaged ten or eleven miles per gallon. Near Miami, Sue Fisher drove her Ford LTD station wagon some four hundred miles per week. “I’m trying to conserve energy by saving trips,” she said, “but the fuel shortage is going to affect us drastically.” Ellen Jackson, of Oakton, Virginia, a suburb of Washington, D.C., acknowledged her family’s automobile dependence: “It’s two miles to the nearest store, and there is no public transportation of any kind. If I don’t drive, my family doesn’t eat.”65 In response to rising fuel costs, citizens began to purchase imported cars that got twice or more the mileage of American makes. The shift in the market devastated American manufacturers. Declining sales soon led to massive layoffs, a pattern that rippled through the steel, rubber, and glass industries.66

As circumstances worsened across the nation, state and federal governments attempted, with little success, to stabilize energy supplies. Legislatures restricted gasoline sales in an effort to prevent long lines, and by December 1973, twenty-one states had imposed highway speed limits of 50 or 55 miles per hour (mph), slowing speeds to burn less fuel. The federal government did more, but not much more. Congress gave President Nixon’s new Federal Energy Office the authority to fix oil prices and ration gasoline. Although the agency tried to keep crude prices down, it never rationed the fuel. Perhaps the federal government’s most significant conservation measure was a national 55 mph speed limit, which the president signed into law in early January 1974.67

Americans served up plenty of blame for “the energy crisis” and the conditions that too often provoked panicked, angry, frenzied, foolish behavior. Many citizens pointed to the Arab nations that had conscripted the flow of oil, or they denounced the oil companies for using the embargo as a pretext to raise prices and gouge consumers. Others censured environmentalists for shutting down domestic wells. A few people blamed their own greed. A sizable number focused their criticism on government. These people accused public officials of ineptitude in regulating, or failing to regulate, gasoline production and sales. More fundamentally, angry citizens conflated the failure of energy policy with other national failures: the United States fought the Vietnam War because of oil fields off the Vietnamese coast; the environmental destructiveness of fossil
fuel extraction was related to the war’s destructiveness; President Nixon used the oil shock to divert attention from his Watergate crimes; the confusion of the oil shock and the confusion of Watergate were similar.66

As the problems compounded, citizens lost confidence in the direction the country was heading. Waiting their turns at the pumps, they wondered what had gone wrong with a form of transportation that once had given them such extraordinary mobility, even freedom. Now it posed so many problems, not only pollution from oil extraction and consumption but also the seemingly helpless dependence on a natural resource that increasingly came from beneath the arid domains of nations far, far away. A motorist summarized the cynicism and despair that gripped people. "You know how I feel about the environmental situation?" Kenneth Johnson asked while waiting to buy gasoline at the Hess station on Peninsula Boulevard in Hempstead, New York. "If we're all going to hell, we might as well drive there."67

DON'T RIDE ALONE

As the fuel crisis deepened, a substantial number of Americans searched for alternatives that might allow them to retain some control over their lives. Entropy and the dissipation of energy jarred their consciousness and opened opportunities for them to engage in cooperative behavior that countered the individualism and social atomization symbolized by the panicked, alienated, lone driver desperately seeking another tank of gas.68 In effect, the diminution of petroleum pools invited Americans to form pools of another kind—social pools in which people united in a common effort that also benefited them individually. Because they had to build the future from the means available to them in the present, they centered their cooperative activity on petroleum fuels and motor vehicles, an effort that required them to participate in the very system that constrained them. The desire for alternatives led a few Americans to new, forgotten, or overlooked energy sources and technologies. Even these, however, were tied—if indirectly—to an increasingly global system of petroleum extraction, refinement, and distribution. The events of 1973–1974 revealed the extent to which American citizens depended on oil and how difficult it would be for them to change.

Signs of an alternative reaction to the oil shock appeared at service stations and on highways, the places most associated with acts of selfishness and desperation. Some service station customers demonstrated a capacity for civility, an essential element of cooperation and proof that not all motorists were irrational "animals." The lunches and thermoses that unnerved Norman Reichbach, for example, also might have been interpreted as evidence of well-meaning people calmly trying to make the best of an inconvenient situation. When motorists talked to each other or listened to music on their car radios, they showed a propensity for patience and restraint. Small goodwill gestures confirmed the basic decency of many drivers and also revealed an awareness of a greater public good. When Peter Russen bought fuel in New York City, he asked for only six gallons, all that he needed to get to the Berkshires Mountains in western Massachusetts. At many service stations, motorists who ran out of gas while waiting in line received a push from the car behind, or from a group of volunteers who got out of their cars and did the job with muscle power. In Tempe, Arizona, a desperate motorist siphoned gas from a stranger's parked automobile and left a $5 bill to pay for it. In San Jose, California, a group of citizen volunteers—the Radio Emergency Associated Citizens Team, or REACT—used telephones and citizens' band radios to help stranded, out-of-gas motorists find open service stations.69

Something other than automotive individualism was at work in American society. To realize their personal objectives, motorists drew on a rich national tradition of cooperative and associational activity centered on households, neighborhoods, schools, churches, workplaces, and technologies. Since the nineteenth century, families, fraternal associations, small business groups, labor unions, farm and consumer cooperatives, women's clubs, and charitable societies had enabled people to work together to meet the challenges of modern industrial society. The self-serving personal autonomy made possible by automobiles contrasted with—if not weakened—the social bonds that held such groups together. Yet Americans proved quite capable of adapting their cooperative strategies to the automobile and related technologies. The American Automobile Association (A.A.A.), founded in 1902 from nine smaller clubs, lobbied for better roads and provided maps, guidebooks, towing services, and insurance to its members. Established in 1962, REACT maintained emergency communications networks among its affiliates. From local to national scales, groups helped individual drivers negotiate the complexities and hazards of the federal highway system, including its modern, multilane freeways.70

The cooperative use of the automobile—and the use of the automobile for cooperative purposes—also took place on an informal, grassroots level. Motor vehicles enabled rural inhabitants to overcome their isolation and gather for
cultural, economic, and political activities. The Great Depression prompted citizens to combine resources, including automobile transportation, as they struggled to make ends meet. Gasoline rationing during the Second World War brought working people together to share rides and the cost of fuel. The federal government encouraged the practice; “When you ride alone you ride with Hitler,” a poster warned. During the years of the civil rights movement, African Americans in Montgomery, Alabama, and other southern cities used churches and community associations to organize car transportation as an alternative to the segregated buses they were boycotting.31

Repeating these established patterns of cooperative activity, a small number of Americans in 1973–1974 began to organize car pools, a simple but effective way to mitigate rising gasoline prices. The movement began slowly. Carpooling was inconvenient for many drivers, and they were unwilling to abandon their existing practices. Many may have been constrained by an automobile-centered landscape in which workplaces, schools, grocery stores, shopping centers, hospitals, and other essential facilities were far apart. In that landscape, individuals needed a car to maintain a reasonable standard of living.32 It was also the case that many motorists had little or no experience with cooperative activity, especially the mutual use of cars. The great age of automotive individualism was well over two decades old by 1973; with each passing year, the collective memory of sharing rides—sometimes an unpleasant memory associated with hard times and deprivation—grew dimmer. A new necessity began to bring some citizens together. Most automobile cooperatives were simple and informal as family members, friends, neighbors, and co-workers shared rides and fuel costs. State and local governments and corporations encouraged and assisted them by laying out staging areas, matching riders with rides, and offering incentives such as car pool lanes, reduced bridge and expressway tolls, and preferred parking.33

As the oil shock deepened, popular attention focused on one of the nation’s oldest and most efficiently run co-ops, the Montclair-Riverside Car Pool (MRCP), which began in 1961 and operated out of Montclair, New Jersey, just west of New York City. Although exceptional in its age and sophistication, the organization represented the potential of automotive cooperation and contrasted starkly with the chaotic scenarios playing out at service stations such as Norman Reichbach’s City Line Flying A, across the Hudson River in Yonkers.

The purpose of MRCP was to transport its members to their jobs at the Interchurch Center on Manhattan’s upper west side. Dedicated in 1960, the center’s massive limestone building on Riverside Drive was headquarters for Methodist, Presbyterian, Lutheran, Baptist, Catholic, and other Christian denominations and for organizations such as the National Council of Churches. In addition to administering their respective operations, the occupants of the center worked together on social, economic, and political problems. Some church personnel lived in Montclair, which appealed to them because of its hilly, wooded, suburban setting, solid middle-class homes, and highly educated population. A fair housing group, which opposed residential segregation, also attracted white and black church employees to the community. In about 1960, a few ministers began to share automobile rides to the Interchurch Center. They had tried public transportation but found the necessary combination of train, bus, and foot travel awkward and time consuming. Car travel, they decided, would be more efficient and pleasant. In 1961, the year before Reichbach opened his service station, they formally incorporated their nonprofit pool and required members to purchase at least one share of stock, then valued at a dollar.34

By 1973–1974, the MRCP was ideally positioned to provide its members with “a collective shield against the perils of the gasoline shortage,” as one newspaper reporter wrote. By then the pool had three station wagons and some thirty members, men and women, white and black, each of whom owned at least one share worth $35 and paid $30 in monthly dues, about half the cost of public transportation to the Interchurch Center in Manhattan. Every morning at 7:30, the cars departed from Thompson’s Hardware for the twenty-two-mile trip. The riders kept up a lively conversation, listened to news on the radio, and debated the issues of the day, including the 1973 Arab-Israeli war. Despite occasional heated exchanges, friendships and social bonds developed. “Oddly enough,” testified Newt Thurber in A.D. Magazine, “I have found a Christian community in a car pool.” As they sped down the highway, MRCP members could not help but contrast their situation with that of the solitary drivers and passengers on the roads. “For a good many years now we’ve been sorry for those people riding alone because we’ve been having so much fun together,” said William Genne. “When we see a Cadillac with a person in the back seat by himself, we feel that is a lonely, deprived individual.”35

The monetary and environmental benefits of sharing machinery and conserving fuel complemented the social rewards of the MRCP. Members calculated that if they drove as individuals, they would need at least twenty-five vehicles instead of three and would burn five hundred more gallons of gasoline every week. The pool also “freed up each member’s family to have just one car,”
388 IT'S A GAS

the Rev. J. Martin Bailey later said. The MRCP had one more benefit, perhaps the most important of all to car commuters in 1973–1974: to encourage pools, the owner of a service station near Thompson's Hardware reserved twenty-five gallons of fuel per week for the group's station wagons.99

The cooperative ethos manifested in the MRCP also was evident in the behavior of other motorists who rolled down the streets and highways of America. Among those motorists were independent truck drivers. Cooperation among independent truckers of necessity took a different form than it did among passenger car drivers. Car commuters transported only themselves to and from work, and they shared vehicles and split fuel costs with relative ease. Independent truckers contracted to move distinct loads (usually farm and food products) across the country in large tractor-trailer rigs. Yet the truckers still found ways to organize, and their response to the dissipation of the nation's petroleum reserves was the boldest, most daring of any group of citizens.

Independent truckers were unlikely cooperators. Many came from rural America, and they saw themselves as hard-working, virtuous, anti-authoritarian, staunchly autonomous operators on whom the well-being of the entire nation rested. Although they were hydrocarbon creatures dependent on oil companies and the federal government, they could downplay this fact as long as fuel was relatively abundant and cheap. Paragons of automotive individualism, the truckers fused rural populist values with petroleum-powered, modern industrial technology to form a unique subculture that celebrated the self-reliant man at the wheel of an enormous machine.97 The trucker mystique found its clearest, most forceful expression in the country-and-western songs that blared from jukeboxes, radios, and tape players. Dave Dudley's "Six Days on the Road" (1963), the most famous trucker hit, celebrated the power and speed of a diesel-burning vehicle (presumably a Kenworth or Peterbilt) as its driver passed Jimmy (GM C) and White trucks, evaded the police and the ICC (Interstate Commerce Commission), and headed for home. Background vocals and instrumental solos complemented Dudley's rich baritone, conveying a sense of mechanical rhythms and the whine of a shifting engine.98

The oil shock of 1973–1974 hit the independent truckers hard and challenged the individualist mystique they had built up around themselves. Diesel prices rose 50 percent that winter, from about $0.35 to $0.50 per gallon in many places and, where most expensive, from $0.35 to $0.70. Fuel shortages, long waits in line, and price increases were bad enough, but the new 70–75 mph speed limits added insult to injury and seemed to be yet another form of oppressive government regulation. Truckers argued that their machines were geared to operate most efficiently at 70–75 mph, and they complained that slower travel forced them to make fewer deliveries. Less fuel at greater expense in combination with slower speeds, they pointed out, worked a hardship on them: it reduced their profits and thus diminished their ability to pay off their vehicle mortgages and support their families. At truck stops around the country, they groused over their coffee and cheeseburgers. By early December, their frustration and anger had risen to the breaking point. The paragons of automotive individualism were on the verge of organizing.99

The strikes began with isolated protests at truck stops and then spread to heavily traveled bottlenecks and junctions of the interstate highways. At the Tomahawk Truck Stop at Brighton, Colorado, fifteen miles northeast of Denver, drivers made known their objection to high prices and government policies by parking their rigs and refusing to move. "The Great White Fathers back in Washington don't give a damn about truck drivers," exclaimed John Welcher, a trucker from Iowa. "We're classified as the lowest form of life. We've got to shut down this country to show 'em what this is doing to us."99 Even as Welcher spoke, truckers in at least nine other states were taking action. Some simply parked and would not budge. Others persuaded sympathetic truck stop owners to close their pumps in order to restrict the movement of all rigs, not just those of the independents. In a few key places, the protests grew to extraordinary size. Some eight hundred trucks blockaded the Delaware Memorial Bridge near the junction of the New Jersey Turnpike and Interstate 95, fouling traffic around Wilmington and backing up vehicles for twelve miles on the New Jersey side. On Interstate 80 a few miles south of Toledo, Ohio, at a major national crossroads, approximately three thousand trucks nearly paralyzed vehicular transportation.99

In these and other spontaneous actions, truckers used their citizens' band (CB) radios to maximum effect. The CB was a relatively simple technology widely adopted after 1958, when the Federal Communications Commission set aside a band of radio frequencies for use by ordinary Americans. In the hands of independent truckers, the CB became a tool for mobilizing and coordinating mass protest. Reaching out to one another on invisible waves of energy generated by the mechanical movement of their petroleum-fired engines, the truckers sensed their collective potential to change the hydrocarbon system that both benefited and constrained them. "The smallest trucking company in
the world has finally spoken," Don Miller said of himself and each of his fellow independents while he sipped coffee at the Toledo ARCO Truck Stop. "Now he's the biggest trucking company in the world." 89

In reality, Miller and his companions less resembled a giant corporation than a grassroots movement. Imagining himself a partner in a giant company perhaps seemed a logical extension of his identity as a businessman, but Miller and his fellows more strongly harked back to the farmers' alliances of an earlier time. Perhaps they even resembled a labor union, which was ironic in light of their resentment of the Teamsters, the nation's largest organization of truck driver employees. The similarities became stronger when independent truckers redoubled their protests in mid-December and again in January and February 1974. In mid-December, they parked their rigs at the pumps of uncooperative truck stop owners, shutting them down. Whether at truck stops or on the highways, stalling or blocking machinery was a version of the laborer's sit-down strike. Truckers also sabotaged the vehicles of uncooperative independents, recalling the Farm Holiday of the 1910s, when agrarians intercepted and destroyed produce shipments in an effort to constrict supply and raise prices. Angry striking truckers attacked—and in two instances killed—stubborn independents, actions that likened the assailants to laborers who beat non-union "scabs." Early in 1974, owner-operators resorted to another labor tactic: they blocked shipments of food and steel, forcing consumers and factory workers as well as business owners to share their pain. 85

State and federal governments had to address the truckers' revolt, which hurt the economy and, when violent, verged on insurrection. In February 1974, William Simon, head of the Federal Energy Office, and three other Nixon administration officials judged the shutdown "a serious threat to the nation's economic well-being and safety" and called on state governors for assistance in "restoring order and commerce." In response, several governors mobilized National Guard units to protect trucking companies and their employees and to keep highway traffic flowing. The Nixon administration also opened negotiations with the owner-operators. William Usery Jr., a federal mediator and labor adviser to the president, soon began deliberations with the Truckers Unity Council, formed the previous month by the Council of Independent Truckers, the Fraternal Association of Steel Haulers, and other representatives of owner-operators. The truckers wanted lower diesel prices, a guaranteed fuel supply, an investigation of the oil companies, and the repeal of the government regulations that frustrated them, including rigid load requirements and the 55 mph speed limit. 86 Flexing their muscles, the owner-operators appeared to be in a strong position to reshape energy distribution in their favor.

Their unity soon inspired another trucker hit, "Convoy" (1973), by C. W. McCall, the pseudonym of William Fries. Reverent, tinged with humor and self-parody, "Convoy" told of two truckers with the CB "handles" of Rubber Duck and Pig Pen who led a thousand vehicles across the nation in defiance of the federal speed limit, state police forces, and the National Guard. In the song of the convoy, the owner-operators found a powerful symbol of independent men joining together in a demonstration of collective masculine strength. Rooted in agrarian, labor, and protest traditions, it expressed a desire to claim a central place in the political economy of America. 87

In the end, the independent truckers could not mobilize enough power to attain their goals. Numbering perhaps seventy-five thousand, they lacked the size and influence necessary to overcome the forces arrayed against them. Grocery stores and steel companies had a vested interest in keeping the goods moving, as did corporate truckers and the Teamsters union, state governors and the Nixon administration. Perhaps more important, the contradiction between the independent truckers' automotive individualism and their need for coordinated action was too great. The final settlement momentarily froze diesel prices and compensated independents with a 6 percent surcharge on goods hauled under contract to trucking companies, but these measures did little to help most owner-operators. Many rejected the agreement as a sellout, and they vowed to continue the strike. But without the resources to sustain them in the absence of regular income, they could not continue. Gradually, they gave up and went back to work. 88

The outcome of the truck drivers' strikes of 1973-1974 was mixed. The truckers contributed to the political pressure that in the 1980s loosened 1973 regulations and repealed the 55 mph speed limit. 89 Beyond that, their overall effect on energy policy was negligible. Although they had mobilized a dramatic effort to redirect the flow of energy through the country, they were too technologically and economically fragmented to prevail. Machines and oil, once the means of their freedom, had become the instruments of their division and dependency.

Those Americans who best recovered a measure of personal autonomy at the time did so by making use of transportation other than motor vehicles. The oil shock of 1973-1974 taught a powerful lesson to those willing and able to absorb it: the car could be a trap, and degrees of freedom lay somewhere beyond

390 IT'S A GAS
for healthy exercise and the experience of nature inspired Americans to take up hiking, mountain climbing, and skiing, but also bicycling. Many outdoor recreationists were baby boomers who carried their childhood enthusiasm for two-wheelers into their teenage and adult years. Manufacturers and importers offered them a sophisticated new machine: the narrow-wheeled, multigeared, lightweight ten-speed. For young people without access to cars, the ten-speed enabled efficient travel over relatively long distances in and out of auto-dependent suburbs, to and from schools, and around college campuses. Bicycle sales, especially of adult models, began to climb. \(^{92}\)

The bicycling trend became a full-blown boom with the advent of the environmental movement and especially Hubbert's peak and the 1973–1974 oil shock. In 1971, dealers sold roughly nine million machines; two years later, some sixteen million rolled from the shops. In 1972, dealers sold more adult bikes than juvenile ones; by 1975, adult models accounted for some 65 percent of sales. Most telling, perhaps, was that Americans during the early 1970s bought more bicycles than cars. As bicycling became more widespread, enthusiasts began to reflect on the human body's energetic potential when applied to pedaling. Together, the body and the bicycle efficiently converted food into mechanical movement. Multiple benefits followed: decreased oil use, increased blood flow, improved health, and peace of mind. "The novice and the regular both know the cyclist's high," bragged one commentator. "It derives, in part, from the knowledge that the energy comes from a live body, not from fossil fuels. The legs pump, the heart answers." \(^{93}\)

Enthusiasm for the bicycle could be overstated, to be sure. In spite of its environmental, physiological, and psychological benefits, it still could not completely liberate citizens from oil; carbohydrates could not completely replace hydrocarbons. From resource extraction to manufacture, distribution, sale, and operation, bicycles, like any other industrial product, needed inputs of petroleum and coal: for refining metal, synthesizing rubber, electrifying factories, fueling delivery trucks and workers' personal automobiles, lubricating ball bearings and chains, and laying asphalt and concrete pavement. Nor did bicyclists give up their cars; only the rare individual completely abandoned one for the other. The United States remained an automobile-centered nation tightly connected to the underground residuum of the Earth's deep organic past. The car-mounted bicycle carrier epitomized the position of the two-wheeler in America. The simple, lightweight device, many versions of which appeared on the market in the early 1970s, allowed a motorist to carry a bike to a repair shop...
The bicycle was an appendage to, an outgrowth of, hydrocarbon society.

Yet the bicycle still had the potential to transform the system. At local and state levels, Americans tapped the flow of oil to build the first pieces of a new order that, if it would not eliminate the need for petroleum, at least would reduce it. In 1971, the state of Oregon passed a “Bicycle Bill” that allocated—or, in the telling phrase of a journalist, “siphoned off”—a percent of its gasoline taxes to pay for the construction of bikeways. The next year, Washington state diverted 0.5 percent of its transportation funds for the same purpose. It was a small start to a trend that might modify the nation’s energy use over the long term. In the aftermath of Hubbert’s peak, local, state, and federal policymakers began to pay more attention to bicycles. In 1973, thirty-one states considered some two hundred bills regarding bikeways and bicycle registration and regulation. At the opening of Bicycles USA, a federally sponsored national conference held in Cambridge, Massachusetts, in May 1973, John Hirten, an official in the U.S. Department of Transportation, declared that it was time for bicycles to assume a “rightful place in the multi-modal mix.” The federal government’s interest was more than just talk; the 1973 Federal Aid Highway Act provided $120 million for bikeways. That was a small sum in comparison with the amount devoted to highway construction and maintenance that year—but it was large in light of the total bikeway budget in 1972: zero.

Other sectors of American society also sensed the growing importance and potential of two-wheeled transportation. The most surprising included the very entities that had invested so much in gasoline consumption and had become the focus of so much customer anger: service stations and the oil companies to which they were subsidiary. In the midst of the oil shock, the Liberty Bell Tire Corporation, which distributed automobile tires and parts to service stations in Philadelphia and its vicinity, began delivering bicycles to its clients for sale to drivers interested in alternative transportation.

More startling still, the Sun Oil Company, headquartered outside Philadelphia, experimented with bicycle sales and service. The corporation’s Suncrest division contracted with Stelber Industries of Brooklyn, New York, for a supply of two-wheelers. Operators of Sunoco stations who paid franchise fees and completed training seminars then sold and serviced the “Suncrest” line, modestly priced at $30 to $100. The Suncrest bicycle program went into effect at twelve Sunoco stations in November 1973; the following spring, the corporation extended the program to dealers in seven states. Angelo Sutera, who owned a Sunoco station in Media, Pennsylvania, southwest of Philadelphia, converted an underused repair bay to a bicycle operation and put his daughter Janice in charge of it during her summer break from college. It proved to be a lucrative enterprise; Sutera estimated that it had netted him a $3,000 profit by early September. Bicycle repair, moreover, reinforced automobile service. After hauling in their bikes, Sutera’s customers often purchased gasoline for their cars.

This corporate shift toward bicycles was modest and incremental. Liberty Bell and Sunoco already sold automobile parts and other mechanical merchandise, so the addition of bicycles merely broadened the scope of their existing operations. Service stations were already well known for sales gimmicks, and they had employees, tools, and spaces easily adapted to bicycle maintenance and repair. Two bicycle mechanics, in fact, Charles and Frank Duryea, had built and operated the first American automobile in 1891.

In one important respect, service station bicycles represented an extraordinary departure from the conventional practices of automobile-centered companies. To the extent that two-wheelers substituted for cars or offered the potential for such a substitution, they were an unprecedented development, a bold step toward an alternative future only beginning to take shape in 1973–1974. From the vantage of a garage bay converted to the assembly, maintenance, and repair of two wheelers, a citizen—without a trace of utopianism—could catch a fleeting glimpse of a very different world.

Americans in fact had options other than automotive individualism and its attendant despair, but whether or not people would continue to pursue those alternatives once the oil embargo ended was an open question. Would they still experiment with energy sources other than fossil fuels? Would they persist in their search for technologies that more efficiently converted energy into mechanical movement? Would they continue to seek the cooperative forms of social organization that gave them greater control over their lives? Perhaps—or perhaps not. Perhaps, in reckless haste, they would continue to spill the precious ancient reservoirs they had found along the universe’s entropic highway. Perhaps the nightmare of the gas line—or worse—would become the norm.

The Picnic’s Over

The First Great Oil Shock concluded in late March 1974 when the Arab members of OPEC voted to end their embargo against the United States. Egypt, Syria,
and Israel, with U.S. assistance, had been negotiating a temporary settlement to the October 1973 war. Satisfied that Israel would withdraw from contested areas on Egypt's Sinai Peninsula, the Arab oreic states once more opened their wells to American consumers. As the oil gushed forth, fuel prices came down, and the lines of cars at service stations disappeared as quickly as they had formed.

Yet the days of carefree hydrocarbon consumption were over. As M. King Hubbert had pointed out, although geological processes still shaped the Earth, new petroleum deposits would not form for hundreds of millions of years. The amount of oil available to humanity was finite, and in the United States, the rising rate of extraction had stalled against that natural limit. The offshore and Alaska discoveries briefly reenergized the country, yet even the rate of extraction from those rich pools soon went into decline. There would be no return to the golden age of automotive individualism; Norman Reichbach and other citizens would never again enjoy the sheer abundance of the seventy years that separated Spindletop from Hubbert's peak and that made America a global superpower.

After 1979, the nation entered a period of environmental, economic, and political turmoil that extended into the twenty-first century. Although no single cause accounted for the tumult, much of it resulted from a fundamental geopolitical condition: the United States consumed more petroleum than it could supply from reserves within its territory. The oil shock of 1973-1974, and then the shock of 1979, when Iran underwent a political revolution that curtailed its oil exports, contributed to economic contractions and restructuring that went on for two decades. Those events also sharpened the nation's claim to Middle East oil. In 1980, following the Soviet Union's invasion of Afghanistan, President Jimmy Carter announced that the United States would resist militarily any threat to its interests in the Persian Gulf region. Eleven years later, President George H. W. Bush, with the approval of Congress, mobilized the U.S. armed forces to repel Iraq's attempted takeover of oilfields in Kuwait. Fought at a time of economic contraction, the Persian Gulf War of 1990 was an outright struggle for petroleum that both anticipated and helped to ensure future conflict.

Economic prosperity briefly visited the United States in the aftermath of its first oil war, but it also brought problems. The adoption of computers and the Internet stimulated production and a rise in personal incomes. In 1995, for the first time in twenty-two years, real wages—a measure of consumer buying power—took an environmental toll, because they intensified the extraction and consumption of natural resources, including fossil fuels. Although computers used less energy and emitted less pollution than did technologies associated with earlier booms, electricity and petroleum still went into their manufacture, distribution, and operation. Consumers with rising incomes also purchased millions of new automobiles, the large sizes of which required more fuel than smaller models. Americans spent more time on the road, often traveling to and from sprawling developments of single-family houses. Increased road time and the consumption of calorie-laden foods—calories packed there by petroleum-intensive production and processing methods— contributed to a growing national problem with obesity. The automobile, it seemed, converted oil deposits not only into mechanical movement but also into ever-deeper reservoirs of human fat.

Troubling events linked to America's hydrocarbon predicament also accompanied the boom—and its conclusion. On April 19, 1995, two American terrorists—one of them a disgruntled, psychopathic veteran of the Gulf War—bombed the Alfred P. Murrah Federal Building in Oklahoma City, killing 168 people. The terrorists constructed their weapon from simple materials readily available to any American. They packed an explosive mixture of diesel fuel and synthetic fertilizer (a petroleum derivative) into the back of a small truck, drove the vehicle to the Murrah Building, and detonated it. The anger and insecurity that compelled that act faded during the next four years of prosperity, but in 1999, signs of shakiness reappeared. That spring, the increasing global demand for oil drove gasoline prices to well over $2.00 per gallon. A year later, overextended Internet companies experienced a dramatic contraction that destroyed fortunes and stalled careers.

While the economy slumped, foreign terrorists mobilized an unprecedented attack on the United States—an attack directly related to the nation's consumption of oil. Many Muslims resented the United States because of its support for Israel and its interventions in the affairs of Middle East nations. An American military force—what some considered an infidel army—on Saudi Arabian soil during the Persian Gulf War intensified their anger. Wealthy Saudis, their bank accounts enriched by petroleum, funded the al-Qaeda terrorist network, which began to strike American targets. On September 11, 2001, nineteen men, most of them from Saudi Arabia, hijacked four airliners leaving Boston, New York, and Washington, D.C., on transcontinental flights.
The hijackers' mission was to destroy prominent buildings and incite worldwide Muslim resistance to the United States and its policies. Passengers forced the terrorists to crash one plane in the Pennsylvania countryside, sparing the United States Capitol, but the hijackers slammed a jet into the Penthouse and plunged two more into the twin towers of the World Trade Center in New York City. All the aircraft had wide bodies and large storage tanks filled with aviation fuel. The infernos that erupted on impact contributed to the death toll—some three thousand—and demonstrated how easily petroleum-powered technologies could become extraordinarily lethal weapons.109

In the aftermath of 9/11, as it became known, America's hydrocarbon predicament worsened. The destruction of the World Trade Center shook national and global markets, producing record losses. Stalled traffic and falling ticket sales hurt airlines and further slowed economic activity. Soon the United States was at war with the Taliban regime in Afghanistan, which harbored al-Qaeda and its operatives. And in the spring of 2003, President George W. Bush, with the near-unanimous approval of Congress, took the nation into war against Iraq. President Bush and his administration asserted that the regime of Saddam Hussein was tied to the terrorists and posed a direct threat to U.S. security. As those rationales collapsed in the absence of evidence, and as the war evolved into a conflict with various tribal, sectarian, and anti-American forces, Bush and his advisers claimed that the nation was fighting for the cause of freedom. Still, there remained a basic material fact: Iraq contained world-class petroleum reserves and occupied a strategically important position on the Persian Gulf. The United States, it seemed, was embroiled in its second oil war.110

As the increasingly costly military ventures in Afghanistan and Iraq dragged on, the nation crossed important hydrocarbon thresholds. M. King Hubbert had forecast in 1969 that world oil production would peak around 2000.111 By that time, economic expansion and industrialization in China and India were absorbing more and more of the world's petroleum, driving prices up. Some analysts also claimed that the rate of production in Saudi Arabia's Ghawar field had begun to decline, although the Saudis vehemently denied it.112 Regardless, by 2004, evidence suggested that the world had reached, or was about to reach, Hubbert's peak. That year, oil prices shot up 30 percent. But the worst was yet to come. World production stopped growing in 2005, and oil rose from $45 to $130 per barrel. By the summer of 2006, gasoline in the United States had surged above $3 per gallon at the pump. By the summer of 2008, the price had gone beyond $4. Princeton University geology professor Kenneth Deffeyes, a proud son of the Oklahoma oil patch and an outspoken proponent of Hubbert's theory, pinpointed December 16 or 17, 2005, as the precise moment of the global peak. Hubbert, he proclaimed, had been right again.113

Many economists and other white-collar analysts disagreed with Deffeyes. The world had nothing to fear, they said. Additional petroleum was hidden in the folds of the abundant Earth, but more important, rising prices would stimulate technological innovations that would enable more thorough extraction from existing fields.114 Deffeyes and the other "Hubbertians" would have none of it. They tended to be scientists and engineers close to the ground, practical people to whom natural limits were a geophysical reality that neither academic theory nor political ideology could deny. "World oil production has now ceased to grow," Deffeyes declared in 2006. "Decline is the next step. The picnic's over."115

The United States crossed a second hydrocarbon threshold at virtually the same time the controversy over Hubbert's peak intensified. Despite the oil shock of 1973-1974, Americans in subsequent years had not curtailed their driving; they actually had driven more. Between 1970 and the early twenty-first century, the number of motor vehicles more than doubled. By 2006, some 230 million of them—more than one for every American aged eighteen and older—rolled down the nation's streets and highways. The saturation of the automobile market had costly consequences. In 2008, the United States experienced its worst economic downturn since the Great Depression of the 1930s. Mortgage defaults on millions of single-family houses in the nation's sprawling, auto-dependent suburbs contributed to the problem. But so did cars—especially the sheer number of them. Americans had lost interest in the "gas-guzzlers" that had been the specialty of U.S. automakers since the late 1990s, and many other people simply could not afford new vehicles. Most important, they could get on with their lives without new vehicles, at least for the time being. By 2009, the automobile companies—including General Motors, once the wealthiest corporation in the world—were in deep financial trouble, if not already bankrupt.116

In combination with war and economic contraction, oil-derived environmental problems hurt the United States. In the spring of 2010, a BP deepwater spill far off the coast of Louisiana blew out. The resulting spill, the worst in the nation's history, fouled the Gulf coast and exacted an enormous toll on marine life, wetlands and estuaries, and the fishing communities that depended on them. Not only was the disaster a severe financial blow and a public relations nightmare for BP, but the negative consequences for President Barack Obama's...
administration showed how easily the intensive use of petroleum created problems that could deflect the course of national politics.127

As damaging as the 2010 spill was, its destructiveness paled in comparison with other potential environmental consequences of humanity's vast consumption of fossil fuels. The greatest of these, perhaps, was global climate change. As oil from the 2010 blowout gushed into the Gulf of Mexico, evidence mounted that carbon dioxide from the burning of oil and coal was contributing to rising temperatures around the planet. In combination with methane, water vapor, and other "greenhouse" gases, CO₂ trapped the sun's warmth, increasing the temperature of the biosphere, altering climate and weather patterns, and wreaking ecological havoc.108 In addition to military conflicts and economic downturns, such environmental devastation offered compelling evidence that the Age of Oil—an age synonymous with the "American Century"—was coming to a close.

Yet the story of America's rise to greatness did not have to end in the hydrocarbon trap and the war, indebtedness, bankruptcy, and ecological devastation that accompanied it. Americans, it seemed, still had the means to shape a favorable outcome. Despite their devotion to automotive individualism, they never completely forgot the lessons of 1973-1974 nor entirely dispensed with the policies and practices that it had inspired. Perhaps the most important legacy of the first great oil shock was a revived and persistent conservation ethic that reminded citizens that they could not sustain their hydrocarbon habits over the long term and that they needed to try something different.

Evidence for that conservation legacy was everywhere. Although the vast majority of Americans still drove to work alone, and many struggled to organize group automobile commutes, the nation never abandoned the practice of carpooling.109 Local, state, and federal governments also retained the concept, as designated car pool lanes on the freeways of every major city evidenced. Mass transit continued as well, supported by citizens who insisted that their tax monies go to subways, streetcars (known as "light rail"), and buses, not just automobiles and pavement. Cars themselves bore the mark of the first great oil shock. In 1975, Congress passed the Energy Policy and Conservation Act, which established "corporate average fuel efficiency" (CAFE) standards for automobiles.110 Although loopholes allowed automakers to manufacture and sell millions of light trucks and sport utility vehicles (SUVs) with larger, less efficient engines, the CAFE program remained in place and offered guidelines by which Congress might reduce the overall quantity of gasoline and diesel that people burned. Many Americans, furthermore, continued to buy and drive small cars, not just "gas hogs," and their desire for automobile efficiency matched that of researchers and conservationists who revived the moribund, nearly forgotten experiment with fuels—alcohol, biodiesel, and others.

Not the least important conservation legacy of 1973-1974 was a persistent interest in bicycles. Saturated markets, cheap gasoline, and conservative opposition stalled the expansion of bicycling from the 1970s to the 1980s, but around 1990, the trend picked up again. In part, consumers powered the movement. Although few Americans rode to work on two-wheelers, they once more purchased large numbers of them, including the fat-tired, multigeared mountain bike. Federal legislation once again funded bicycle infrastructure and programs. In 1991 and 1998, bicycling activists and their supporters in Congress defeated political opponents and reauthorized substantial expenditures of funds for alternative transportation. Between 1998 and 2009, appropriations allocated some $6 billion to bicycle and pedestrian projects. Local and national interest groups assisted local efforts to make way for bikes. The League of American Wheelmen, reorganized in 1919 and renamed the League of American Bicyclists (LAB) in 1994, instituted a Bicycle Friendly America Program. Participating communities demonstrated minimum commitments of infrastructure and other resources to encourage the use of two-wheelers. By 2010, some 140 communities met LAB standards at the bronze, silver, gold, or platinum level.111

Activists also drew on earlier state laws for legal leverage against policymakers and officials reluctant to make way for bicycles. In Portland, Oregon, an LAB platinum community, citizens sued the 1971 state Bicycle Bill as the basis for a lawsuit that compelled the city to put in bikeways and sidewalks on major street projects. In Portland and other municipalities, planners discovered that bicycle-friendly infrastructure enabled an increase in bicyclists.112 In keeping with this reorientation of urban landscapes, Americans bought two-wheelers in large numbers, often prompted by the rising price of gasoline. In 2005, the year of global Hubbert's peak, bicycle purchases spiked, rising to some 20 million from 15.5 million two years before. By then, approximately 100 million Americans, one-third of the population, owned two-wheelers.113 There were good reasons to be skeptical that citizens could reinvent their lives and landscapes to the bicycle, but the potential for the machine to substantially alter energy use was undeniable.114 A pedal-powered future was within reach.

America's hydrocarbon predicament has been and always will be a function
of a universal thermodynamic condition. Impossible to stop or reverse, the
dissipation of light and heat—the unstoppable flow of energy that marks the
passage of time—is a harsh taskmaster, the driver of history and the maker of
tragedy. Although the fundamental human problem is to live reasonably within
its dictates, there is no perfect way to do that—there is, in short, no trouble-free
route to life, liberty, and happiness. Every option, if not bad, is less than per-
fected—and thus inherently tragic. The challenge is to see through the tragedy to
the choices that ensure the greatest range of flexibility and that enable the best,
rather than the worst, of human tendencies.

The route to that optimal future begins in the past, at places like Norman
Reichbach’s City Line Flying A. Its origin is in half-empty gas tanks and lighter
wallets, in stalled vehicles, pounding hearts, clenched fists, gunfire, and burn-
ing buildings. It begins in the odor of volatile hydrocarbon compounds that
have the power to arouse equally volatile human tempers. It begins in oil spots
on smooth concrete, grime beneath fingernails, queasy feelings deep in the gut,
full bladders, frenzied family schedules, and human fat. And it begins where-
ever Americans come together to imagine possibilities they have forgotten or
never known existed. There, the ability to find a way forward is most pow-
erful. There, amid reinvigorated lives, renewed purpose, and restored dreams,
another future, perhaps better than the last, begins to take shape. *

PATHS THAT BECKON

IT IS A TRUISM THAT WE SEE WHAT
we want to see. "The moment a person forms a theory," Thomas Jefferson
wrote in 1787, "his imagination seizes, in every object, only the traits which
favor that theory." Perhaps it is hazardous to look for nature at every step in
the American past, in every idea, activity, conflict, person, and thing. The
theory yields the evidence that confirms it; the environmental historian loses
sight of all else. Yet if the journey from the Lincoln Memorial risks tunnel
vision, it also carries a reward: the experience, almost like discovery, of won-
ders that the eyes have missed because the viewer has not known how to
see. The surprises appear at every turn. Words and images come back to life.
Distinctions between mind and matter dissolve. Seemingly unrelated events
unite in vivid stories that reorient time, space, and relationships. Together,
the pieces reveal the totality of a forgotten material force that shaped the
founding and development of the republic.

Recovering the nature of American history is a demanding project that
requires the effort of many scholars. The paths are many; the method is
straightforward. Choose a topic. Ask the question: How did nature matter?
Gather evidence. Think about it. And begin.

ALL NATURE IS FULL OF GOD

During the 1730s and 1740s, the American colonies experienced a religious
revival known as the Great Awakening. Grassroots preachers, farmers, artisans,