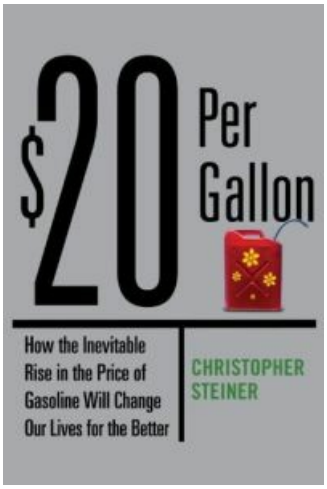

Book $20 per Gallon

How the Inevitable Rise in the Price of Gasoline Will Change Our Lives for the Better

Christopher Steiner
Grand Central, 2009

Recommendation

For decades, Americans reveled in cheap gasoline, becoming addicted to the easy life of readily available, relatively inexpensive fuel – but those days are rapidly coming to an end. To explain the impact of rising gas costs, *Forbes* magazine reporter Christopher Steiner explains how higher gasoline prices will affect American society. Steiner cleverly organizes his chapters according to gas prices, starting at $6 per gallon and rising to $20 per gallon. In the process, he uncovers compelling evidence about the shock such fuel price increases will cause. He bases his conclusions on impressive research about the future of US energy consumption. *BooksInShort* finds this book compelling reading for anyone who is paying attention to America's energy future – or who is gradually becoming aware that such attention is long overdue.

Take-Aways

- After enjoying some of "the cheapest oil in history," the US will undergo a significant transformation as gasoline prices inexorably rise.
- Increasing demand, dwindling supply and an out-of-date infrastructure all point to oil price increases.
- When gas reaches $6 per gallon, Americans will drive less, have fewer auto accidents and may even suffer less obesity.
- At $8 per gallon, airfares will soar, and several major airlines will fail.
- At $10 per gallon, electric and other alternative-fuel cars will become more affordable.
- At $12 per gallon, many people will abandon distant suburbs for major cities.
- At $14 per gallon, individuals will cut their driving by 50%. They'll opt to live and work in small towns. Big box stores like Walmart will feel the pinch.
- At $16 per gallon, the world's food and agricultural systems will change, resulting in more locally produced, fresher and healthier food.
- At $18 per gallon, the US will have to prioritize a national, high-speed rail network.
- At $20 per gallon, recapturing and reusing wasted energy will alter US lifestyles.

Summary

How Oil Holds the US Captive

Oil and its main derivative product, gasoline, are essential to modern American life. The US imports two-thirds of all the oil it consumes but uses less than half of that imported oil to fuel vehicles. Manufacturers transform the rest into everyday products – everything from plastics, countertops and cosmetics to building materials, glues and roadways. These products and more depend on the availability and cost of oil. But the reality is that oil prices will continue to rise, and that fact will change the way people worldwide produce and deliver goods and services. Over the past few decades, the US has enjoyed "the cheapest oil in history," but American society will undergo a significant transformation as gas prices move to $20 per gallon and beyond.

> "How can something that's been around for so many years, in such utter abundance, suddenly see its value rise and fall with such confounding volatility?"

Price increases are inevitable because oil demand is growing globally while oil supplies are becoming more difficult to find and more expensive to extract. Oil demand decreased in 2008 and 2009, but that was only a temporary dip; the longer trend is for an emerging "global middle class" to drive more cars, consume more commodities, and thus need more and more oil.

> "During 2008, a year when gas prices touched historical highs, Americans drove 100 billion fewer miles than they did the year before."

The oil exploration business has also dramatically changed. Oil-producing countries such as Nigeria, Russia and Venezuela have excluded major independent companies in favor of their own national oil firms. As a result, in 2007, the big multinationals spent five times more money buying back their own shares than exploring for new oil. Even though the US is now drilling 40,000 oil wells a year – the most in 20 years – it has failed to increase its oil production. Oil fields typically mature after 50 years and then they produce less oil. Today, the world's 14 largest oil fields have an average age of 49 years. Internationally, even the "megafields" of Saudi Arabia and Mexico are in decline. All this spells the end of cheap, readily accessible oil.

> "The swooning momentum of oil prices can be a tricky bull to corral."

Adding to the problem is that 80% of the world's oil infrastructure – the mechanical components that refine, transport and hold oil and gasoline – are outdated and corroding. One estimate says that replacing these aging plants could cost $50 trillion, a huge outlay that oil companies will pass along to consumers. Economics dictates that prices of other sources of energy – coal, natural gas, nuclear power and ethanol – will also surge as gasoline costs rise.

Gas at $6 per Gallon

When gasoline reaches $6 per gallon, some automakers will fail, and American drivers will begin using more diesel-powered vehicles, which get better mileage. Higher gas prices will yield some positive results: Americans will drive less and have fewer auto accidents. Air quality will improve, so fewer people will die of lung-related illnesses. One study even suggests that for every $1 rise in gas prices, the US's obesity rate will drop by 10%.

> "A future of higher gasoline prices means higher energy prices across the board."

When Americans drive less, federal fuel tax revenues – currently 18.4 cents per gallon – will fall, leading to less funding for already overdue bridge and road repairs. One estimate says the nation needs to spend $1.6 trillion to repair or replace worn tunnels, bridges and roads. As gasoline becomes more costly, the number of private toll roads and bridges could increase. About half of all US states will allow private firms to manage and collect tolls on public roads and bridges. Rising gas prices will reduce the availability of school bus transportation and prompt an increase in the number of police foot patrols, which will put cops on bicycles, horses and Segways.

Gas at $8 per Gallon

The aviation industry is highly dependent on fuel prices, so the specter of rising oil costs haunts airlines. At $8 per gallon, jet fuel will account for 60% of industry operating costs. Higher fuel expenses will bankrupt many carriers and increase ticket prices significantly; at this price, the sector will lose 200,000 jobs and $67 billion in revenues. According to industry analysts, the most vulnerable airlines are US Airways, United, Delta and American. Southwest Airlines and JetBlue will emerge as the strongest competitors due to their newer, more fuel-efficient fleets.

> "The price of gas will leverage change, fundamentally altering nearly every facet of our lives."

As gas hits the $8 mark, "the American domestic network will contract to 50% of its current size." Small regional carriers will cease to exist; larger planes flying fewer flights per day will replace them. International airfares will become prohibitively expensive. Cities with multiple airports will consolidate them due to diminished traffic. Towns that rely on jet-setting visitors, such as Jackson Hole, Wyoming, and Vail, Colorado, will see reduced numbers of travelers and decreases in vacation home prices.

> "Almost half of airlines' costs – including the price of planes, ground crews, pilots, insurance, airport fees, maintenance – comes from the hydrocarbons needed to keep these sleek, purring machines aloft."

On the bright side, Boeing is now building its new fleet of 787 jumbo jets from carbon laminate composite instead of aluminum. These planes burn 20% less fuel than traditional aircraft. Airlines worldwide have already ordered 900 of these planes at $150 million each.

Gas at $10 per Gallon

Electric vehicles are available today on a limited basis, but $10-per-gallon gasoline will make them invaluable – and more common. The United Parcel Service (UPS) already maintains a "fleet of 1,600 alternate-fuel vehicles" using electricity, propane and natural gas. UPS set up the world's largest private contingent of nongasoline vehicles because its fuel costs – already $2.1 billion in 2005 – doubled by 2008. Although electric trucks now cost UPS more than $100,000 each, versus $50,000 for a gasoline-powered truck, higher demand will likely bring prices down in the future.

> "Gas prices at $10 a gallon may seem far away, but if you look at the fundamentals of the world's supplies and the certainty of rising demands, it's a number we will almost definitely see within the next 10 years."

To make the transition to all-electric cars, some Americans today drive hybrids that run on a combination of gasoline and battery power. These expensive cars are hard to justify when gas costs less than $6 per gallon, but they'll be far more popular at $10 per gallon. Up-and-coming alternatives to electric cars include vehicles with "hydraulic hybrid drivetrain[s]" fueled by hydraulic fluid, as well as autos that run on compressed "air power."

Gas at $12 per Gallon

At this price, people will move back into cities, where they'll do without cars and save on fuel. Higher density populations will mean greater use of mass transit and the renovation of neglected downtowns, especially in cities like Detroit, St. Louis and Cleveland. Local taxes will have to increase to pay for these updates. Gas at $12 per gallon will discourage many American citizens from owning large, suburban homes that are remote from shopping centers and other necessary amenities. Average house sizes will decrease, and suburbs far from cities will see a permanent drop in real estate prices as commuting becomes too expensive.

> "If civilization is to march forward...a couple of acres simply won't be an accessible or realistic part of most Americans' lives, nor...will a huge house and a huge yard be a desirable way to live."

South Korea is using innovative green technologies to build New Songdo City, just outside Seoul. Constructed entirely from scratch on landfill in the Yellow Sea, Songdo will be "the most energy- and resource-efficient city in the world" when it's completed in 2015. The $40-$60 billion project will eventually boast the same population density as Manhattan. The city's projected 65,000 inhabitants – along with some 300,000 commuting workers – will live and work in computer-controlled buildings that provide them with real-time transit and traffic information, allowing people to time their trips more efficiently. Homes will reuse gray water to irrigate plants and to flush toilets. Elevators in the city's high-rise towers will be gearless to save energy.

Gas at $14 per Gallon

At $14-a-gallon gas, Walmart will face a serious threat: Its big box stores will suffer as fewer shoppers drive to its suburban sites. Though "Walmart by itself is China's eighth-largest trading partner," the giant retailer will have to restrict its Chinese imports to save transportation costs. Distributing goods to the company's 4,000 US stores using its fleet of 7,200 trucks will become very expensive. About 80% of Walmart's 6,000 suppliers worldwide are in China, so when expensive fuel disrupts this global supply chain, it will wreak economic havoc in China.

> "Stores will return to the downtowns of yore as small towns' populations...to the small-town infrastructure that their grandparents and great-grandparents built."

Shopping, traveling and living patterns will change as people stay within a two-mile radius of their homes. This could revitalize deserted Main Streets in many small towns, as workers who face long commutes to urban centers will abandon the practice. Internet-connected specialists who work remotely will increasingly populate small towns. Residents will buy more locally grown food and go back to using older forms of transportation like railroads. When gas reaches $14, many roads will close and people will cut their driving to half of what it is today.

> "Sushi restaurants...will dwindle in an environment where their core offerings of fresh, raw seafood have jumped astronomically in price."

Rising gas prices will act like a tariff on imported goods, especially those from Asia. Gas at $14 equals a 25% tariff on imports; that may result in American importers and manufacturers relocating their overseas factories back to the US.

Gas at $16 per Gallon

Cheap oil connects inexpensive sources of food and labor with markets worldwide. People in Illinois see Asian carp as a disastrous environmental intruder, but fishermen catch them and sell them to processors, who ship them to markets worldwide because Asian consumers consider them a delicacy. Norway sends cod from its native waters to China for processing. Then, China sends it back to Norway for consumption. Italy, now the world's largest exporter of kiwis, satisfies the world's year-round demand for New Zealand's seasonal fruit. All of this commerce depends on cheap gas.

> "The advent of a true high-speed train network in America will be the ultimate sign that our world has adapted to oil's scarcity."

When gas reaches $16 per gallon, the impact will reconfigure the world's food and agricultural systems, causing changes in farming, fishing and transportation. Rising freight and fishing costs will curtail consumption of some fish species, allowing their populations to replenish. Higher transportation costs will prompt the creation of smaller farms within 100 miles of large cities. Locally grown produce will mean fresher and healthier choices for consumers.

Gas at $18 per Gallon

Railroads remain an economical way to ship goods – 436 cubic tons can move one mile on one gallon of gas. High-speed rail for passengers is even better, since the trains run on electricity. But historically, cheap gas has sidelined the US passenger railway system, leading to widespread neglect. To build a national, high-speed rail network could cost trillions of dollars, but $18-per-gallon gas would make it a priority. So far, US policy makers have not committed to building high-speed railways, unlike their British, French, Japanese, Chinese, German, Russian and Korean counterparts. Some of these nations' trains exceed speeds of 200 miles per hour, while the fastest US train between Washington and Boston tops out at about 130 miles per hour.

> "The future energy world...will be ruled by strict efficiency metrics, not mere it-works-so-don't-fix-it methodologies."

American transportation policy has always favored highways. Since 1956, taxpayers have spent $3.5 trillion on roads, but less than 5% of that amount on railroads. Worse, gas taxes and other federal funds averaging $500 per auto passenger go toward road repair and construction, but state monies of only $40 per train passenger maintain the rails. This amounts to a lopsided federal subsidy for gas-powered vehicles, but even with this government largesse, auto companies still struggle for profitability. The military also uses tremendous amounts of fuel. At $18 per gallon, a B-52 will cost $60,000 an hour to fly. To curtail energy costs, "the Air Force has been experimenting with synthetic fuels made from natural gas and coal." By 2016, it expects to use synthetic compounds for half its jet-fuel needs.

Gas at $20 per Gallon

With gas at $20 per gallon, energy conservation means capturing and reusing wasted energy. Manufacturers that make drywall, steel, paint and glass, among other products, will retrofit their plants to capture and exploit the excess heat they generate. Thousands of these plants operate today, and many of them squander energy and contribute to carbon dioxide emissions. Recapturing the heat wasted in US manufacturing could power 50 million homes. Reclamation requires improving the national electric grid, which now operates at only 33% of total efficiency.

> "Our homes, our cars, our jobs, our vacations – throughout they will all change, step by step, with the price at the pump."

Local production of heat and energy, called cogeneration, is especially attractive in dense urban areas, which would rely on neighborhood natural gas turbines. When a

gallon of gas costs $20, solar, wind and geothermal energy will add to the supply of electricity, while coal will have to overcome its inherent pollution problems. Nuclear energy, despite continuing issues over waste disposal, will proliferate worldwide. As gas prices increase, Americans will reshape their lifestyles to reflect the new energy reality.

About the Author

Christopher Steiner, a civil engineer, writes for *Forbes* magazine.