

# Poverty, Renewables and Reality

*A book review on  
Robert Bryce's  
A Question of Power*

**Those reading this within the COVID-19 crisis on their shelter-in-place personal computers** are presumably among the part of the world's 7.4 billion people who live in what author Robert Bryce refers to in *A Question of Power: Electricity and the Wealth of Nations* (released March 2020) as "high-watt" countries. By Bryce's definition, a high-watt country is where per capita electricity use exceeds 4,000 kilowatt-hours per year. To put this in perspective, Bryce estimates that his kitchen refrigerator, a typical American model purchased at Home Depot in 2007, uses about 1,000 kilowatt-hours of electricity per year.

Roughly 3.3 billion people on the planet live in what Bryce calls the "unplugged" world — countries where per capita electricity use is less than 1,000 kilowatt-hours per year. That means that roughly 44.6% of the world's population — so practically all of India's 1.5 billion people as well as those living in 73 other countries (including all of Africa) — subsist on less electricity per year than the average American family uses to keep their refrigerator running. About 1 billion people of this 3.3 billion have no access to electricity.

Bryce's third category, the "low-watt" world, where per capita electricity use is between 1,000 and 4,000 kilowatt-hours per year, includes roughly 2.7 billion people living in 68 countries, or about 36.7% of the world's population. The low-watt world includes countries like China, Ukraine and Turkey on the borderline with the high-watt world as well as numerous other countries on the borderline with the unplugged.

The United States, with its estimated 2020 population of 330 million people, and 62 other countries are part of the roughly 18.7% of the world's population living in the high-watt countries that have benefited the most from the electrical revolution inaugurated, as Bryce reminds us, when Thomas Edison opened his first electric power station in lower Manhattan, New York City, in 1882. This leads to the central theme of Bryce's book — that electricity for the past almost 140 years has been the world's most important and fastest growing form of energy. Countries with electricity that is cheap, abundant and reliable are rich; those without are literally in the dark — and poor.



by/ PAUL YALE, CPL

## LANDMEN, NATURAL GAS AND CLEAN AIR

So why should a book written on this topic be important to landmen and the lawyers who support them? First, practically all of us live in the U.S. and Canada and have the luxury of plugging a personal computer into a reliable source of electricity, barring an occasional weather or capacity related blackout. And if — like me — you live in Houston or elsewhere in the southern United States, as Bryce notes in his book, you are also among the 8% of 2.8 billion people on the planet living in hot-climate latitudes who can enjoy air conditioning. So, we should count our lucky stars that we live in the high-watt world.

Second, and on a similar note, if you are among the unfortunate to have contracted COVID-19 or will do so before this pandemic is over, your chances of surviving the disease are infinitely greater in a “plugged” city like Houston, with its reliable and relatively affordable electricity available to run hospitals and other medical facilities, than it would be in the many unplugged countries around the world. It is frightening to think of the suffering and death that may occur if COVID-19 were to take even deeper root in not only North America and Europe, but also among the 3.2 billion people on the planet living in the unplugged world before vaccines can be made broadly available worldwide.

Third, *A Question of Power* reminded me how landmen and the lawyers who support them have become critical parts of the supply chain feeding our nation’s electric power grid. We are not just in the oil and gas business — we are instrumental in the production of U.S. electricity. As Bryce points out, between 2007 and 2019, U.S. gas production soared from 50 billion cubic feet of gas per day to about 90 billion cubic feet per day, an 80% increase in just 12 years. Much of that natural gas goes to fuel the nation’s electric power grid and has been largely responsible for the ongoing displacement of coal-fired electric

power plants in the United States. Without landmen acquiring the underlying leases for natural gas fields and otherwise making land trades, this could never have happened.

The displacement of coal by natural gas as the preferred fuel for electric plants in the U.S. has had significant environmental benefits. As Bryce notes in *Power Hungry: The Myths of “Green” Energy and the Real Fuels of the Future*, natural gas emits about half as much carbon dioxide as coal and releases no particulates, nor significant quantities of other pollutants, such as sulfur dioxide or nitrogen oxides. Increased utilization of natural gas has been among the chief drivers of steadily improving U.S. air quality over the past 10 years, though that fact is seldom mentioned by Green New Deal politicians when they rail on about fossil fuels and hydraulic fracturing.

## ELECTRIC PIONEERS, EMANCIPATION OF WOMEN AND WATTS INTO WEED

*A Question of Power* provides a fascinating history of the explosive growth of the worldwide electric grid, which began only 138 years ago (a blink in the eye of human history) in Edison’s lower Manhattan power plant. Bryce talks about the other early pioneers of electricity — such as Nikola Tesla, inventor of the alternating current electric motor, George Westinghouse Jr., inventor of the electric transformer, and Frank Sprague, inventor of the electric elevator — and how indebted we are to them for our modern standard of living. Bryce also describes how Franklin D. Roosevelt was elected president in the 1930s in part because of his opposition to national holding companies attempting to monopolize electric power, and how Lyndon B. Johnson catapulted himself to national prominence in those years by championing legislation that promoted rural electrification in his Texas Hill Country Congressional District and beyond.

Other topics addressed include

how electricity emancipated women and girls from the pump, the washtub and the wood burning stove, or at least generally so in the high-watt countries in the world. Bryce devotes a chapter to the continued dominance of coal in electric power generation worldwide due to its relative low cost and accessibility, irrespective that burning coal is one of the primary sources of manmade greenhouse emissions. This is because in the unplugged and low-watt worlds where most of humanity lives, climate change is less of an issue than poverty and survival. Another chapter discusses how the electric grid enabled the internet and led to explosive growth of companies such as Microsoft, Apple, Amazon, Google and Facebook. In the “Watts Into Weed” chapter, he describes how the marijuana industry in Colorado and elsewhere uses electricity to grow weed indoors, leading to higher production rates and a more potent product, especially when produced in the unregulated black market.

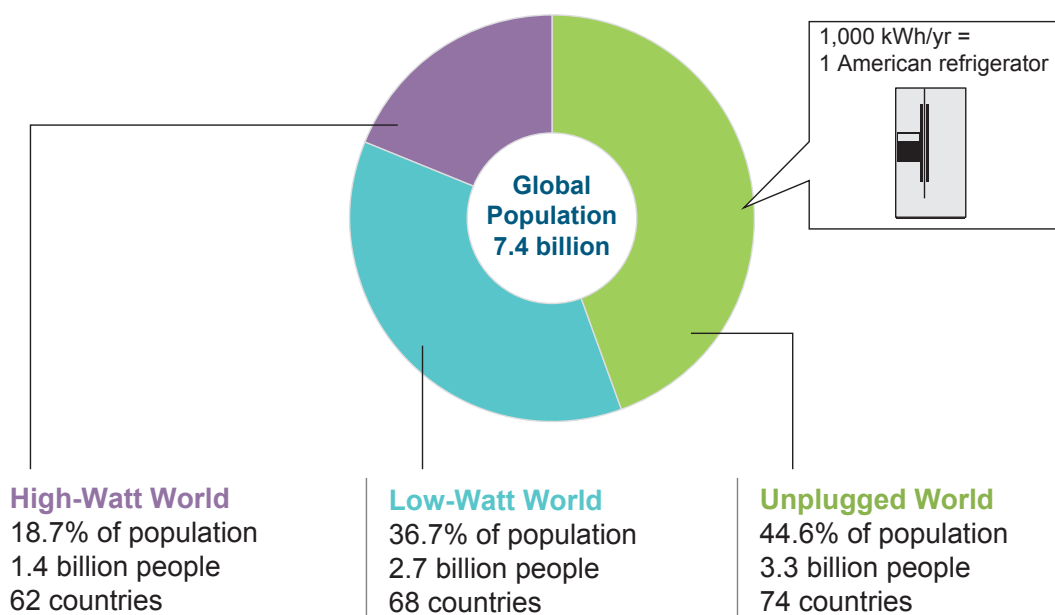
## THE AUTHOR: ROBERT BRYCE

*A Question of Power* is the sixth book written by Bryce, an Austin, Texas-based journalist who specializes in energy related topics. Each of the three prior books by Bryce that I read — *Gusher of Lies* (2008), *Power Hungry* (2010) and *Smaller Faster Lighter Denser Cheaper* (2014) — incorporate rigorous devotion to numbers, facts and logic in analyzing some of the most important energy policy questions of our time. The preface to *Power Hungry* quotes John McCarthy, a computer pioneer at Stanford University, who wrote, “He who refuses to do arithmetic is doomed to talk nonsense.”

In his preface to *Gusher of Lies*, Bryce explains: “I do not write this book with a political agenda, or at least not one that comes from any partisan convictions. I am neither Democrat nor Republican. I am a charter member of the Disgusted Party.”

Bryce’s impatience (to put it mildly) with those who ignore energy

## Who Gets the Juice?



Source: Robert Bryce and *A Question of Power: Electricity and the Wealth of Nations*, from World Bank data.

realities — and worse, spin political narratives not based on facts or data — is one of the recurring themes in *A Question of Power* and his previous books. (Example: He describes U.S. biofuel subsidies (tongue-in-cheek?) as a “crime against humanity” in *Smaller Faster Lighter Denser Cheaper*.)

Bryce has stated that his approach to climate change is essentially agnostic. He professes neither belief nor disbelief in human induced global climate change. What Bryce believes in are numbers and reality. In *A Question of Power* his view of renewable energy is that while it is laudable to increase utilization of wind, solar and other technologies with a lower carbon impact than fossil fuels (especially nuclear power), wind and solar energy sources alone are simply not going to be enough to meet “the terawatt challenge.”

### THE TERAWATT CHALLENGE AND HAPPY TALK

The terawatt challenge is the task of meeting what is expected to

be a doubling of demand for global electricity over the next 20-30 years. This growth in electricity usage goes side by side with projected increases in the world’s population, which is expected to grow to 9.7 billion people by 2050, or over 2 billion more people than those living on the planet in 2020.

Those living in climates like Houston’s can appreciate the reason for at least some of this increase in electric demand. Bryce quotes an International Energy Agency estimate that the global stock of air conditioners will triple during the next three decades, meaning there will be “10 new air conditioners sold every second for the next 30 years.”

In this same time frame, however, Green New Dealers in the United States and climate activists worldwide want to eliminate all use of fossil fuels. Bryce reminds us that Senators Bernie Sanders of Vermont, Jeff Merkley of Oregon, Cory Booker of New Jersey and Edward Markey of Massachusetts, introduced the “100 by ‘50 Act” calling for the United States to be free of fossil fuels by 2050. As this review was written in

late 2020, similar sentiments were being expressed by the incoming administration of President Joe Biden.

In “This is My Land” — a chapter of particular interest to oil and gas landmen and lawyers — Bryce makes the case that, putting aside the incurable intermittency of wind and solar power, which absent dramatic advances in battery storage technology cannot be relied upon exclusively to meet all U.S. energy needs, there is simply not enough political will in the United States to set aside the land required to accommodate 100% reliance on wind and solar energy. This is because all evidence shows that Americans will simply not tolerate hundreds of thousands of 500- to 600-foot tall wind turbines blanketing the countryside, much less the tens of thousands of miles of new, high voltage electric transmission towers that massive wind and solar farms require.

In a recent interview with *Power Hour* podcast host Alex Epstein, Bryce references the Vermont Public Utility Commission’s decision in

late 2019 to decline to permit the “Dairy Air Wind project,” the last of the dozen or so wind turbine permit applications made in Vermont in recent years. Vermonters, as Bryce points out, hate wind turbines. So even in Bernie Sanders’ home state, the political will to move forward with wind projects is wholly lacking.

Similarly, in California, which has a stated goal of relying 60% on renewable energies by 2030, Bryce observes that it is virtually impossible to get new, large-scale wind and solar projects permitted. San Bernardino County, California, the nation’s largest county by land mass, has permitted no large-scale renewable energy projects in recent years. Since 2013, only 200 megawatts of new wind-powered electricity projects have been permitted in California.

A megawatt is 1 million watts, or 1,000 kilowatts. As noted earlier, 1,000 kilowatt-hours is roughly the power needed to supply the average American’s refrigerator for one year. So, the total of all new wind projects permitted in California since 2013 — a state of roughly 40 million people in 2020 — might be enough to power an additional 200 refrigerators. Yet many politicians in California want to move forward with the abandonment of all of its nuclear and gas-fired power plants in favor of wind and solar. This is the same state that experienced brownouts in the summer of 2020, which some very brave analysts attributed to overreliance on wind and solar sources, despite fierce political blowback.

At present wind and solar account for only 20% or so of California’s electric power grid sources. So what will be happening in California in terms of grid reliability 10 years from now when wind and solar are expected to account for 60% of its energy supplies? More happy talk? Time will tell.

In *A Question of Power* Bryce also uses the example of the Indian Point nuclear reactor in Buchanan, New York, north of New York City, which covers a footprint of one square kilometer (0.4 square mile) from

which it pumps out 16.4 terawatt-hours of zero-carbon electricity per year, furnishing one-eighth of the electricity needed by New York City and its 8.6 million inhabitants. A comparable wind farm would require 1,300 times as much land to generate the same power. Yet the wind farm would be intermittent, and it would make nearby land uninhabitable or at least deleterious to human health, due to low frequency noise and infrasound.

Bryce reports that despite this and in response to political pressure from environmentalists, New York Gov. Andrew Cuomo announced in 2017 that two reactors within the Indian Point facility would be permanently shuttered. This is in line with a nationwide trend against expanding use of nuclear power, including California, which as Bryce reports is shuttering all of its nuclear power plants by 2025, despite the fact that the state’s electricity rates rose over five times the national average from 2011-2017.

To put that in perspective, if the U.S. decided to meet all of its present day electricity consumption with wind, according to reports cited by Bryce from two Harvard professors (Lee Miller and David Keith), it would require 12% of the continental United States to be set aside for wind farms. That is twice the size of California.

Bryce cites the late David MacKay, who was a physics professor at Cambridge, as calculating that wind power needs about 700 times more land to produce the same energy that an oil and gas drilling site can produce from hydraulic fracturing. Bryce quotes MacKay as saying, “I love renewables, but I am also pro arithmetic.”

What about solar power? Bryce describes how in California, the 377-megawatt Ivanpah solar complex in the Mojave Desert met fierce opposition from conservationists due to its impact on the desert tortoise, which is listed as a threatened species under the Endangered Species Act. The Ivanpah project covers 14 square kilometers (14 times the size of the Indian Point nuclear facility

in New York, though producing 377 megawatts instead of 16.4 terawatts). Bryce predicts that because of backlash, Ivanpah will likely be one of the very few large-scale solar thermal projects built in the United States. He cites opposition to solar projects in Maryland, New York and Virginia as further evidence of grassroots resistance to large-scale solar projects throughout the country.

So where does this not-in-my-backyard attitude among wind and solar energy advocates leave the U.S. on the road to meet the terawatt challenge? Bryce in his previous books has used the phrase “happy talk” to describe the more extreme unsupported positions of the environmental lobby when it comes to wind and solar. But the notion that fossil fuels can be replaced completely by wind and solar by 2050 is worse than happy talk, says Bryce — it is “appallingly delusional” (quoting MacKay).

## ADVANTAGES OF NATURAL GAS IN FUELING ELECTRIC POWER

Despite the recent oil and gas price meltdown that occurred simultaneously with the COVID-19 crisis, over the longer term landmen and oil and gas lawyers can be comforted by expected continued growth of the U.S. natural gas energy sector, irrespective of the happy talk of the Green New Dealers and others who want to completely abandon fossil fuels within the next 30 years. This is because natural gas-fired electric power generation affords incontrovertible advantages over competing sources of solar and wind when it comes to cost, storage, scale and land use — the four factors Bryce says will prevent wind and solar energy from taking over the electric power system. The land footprint of the typical natural gas well is not only much smaller and less obtrusive than wind and solar installations, it also has the advantages of lower cost and larger scale. And unlike wind and solar, natural gas is easy to store, and its production can more readily fluctuate with demand. The United

States has huge resources of natural gas and — unlike wind and solar — existing natural gas infrastructure that can transport much of it to most U.S. markets by existing land pipelines or through liquefied natural gas terminals.

U.S. natural gas also enjoys an advantage over nuclear power, though nuclear power has much higher energy density than natural gas. That advantage relates to what Bryce calls the “radiophobia” that Greenpeace and others have instilled about the nuclear industry following the incidents at Three Mile Island (1979, Pennsylvania), Chernobyl (1986, Ukraine, Soviet Union) and Fukushima Daiichi (2011, Japan). Americans are more used to living with natural gas fields and pipelines than they are nuclear power plants.

More recently, the oil and gas industry and its regulators have put in place systems to mitigate risks of earthquakes spawned by underground injection of produced wastewater, almost none of which has caused significant damage or injury. Putting earthquake risks aside, nuclear waste disposal is more problematic than underground injection of hydraulic fluid wastewater. In addition, nuclear power plants require much more extensive startup capital investment than natural gas facilities.

Not that U.S. natural gas production practices and infrastructure cannot be improved. For example, there have been recent calls in Texas to discontinue flaring of natural gas in the Permian Basin of West Texas. This would necessitate shutting in oil production to expand and build upon natural gas pipeline infrastructure. But what better time to shut in oil production to cease gas flaring than when there is a glut in the world markets and prices are at historic lows? Permian gas flaring should be ended to save Permian oil and gas for the longer term.

This is also true in the Bakken in North Dakota and in other oil plays in the U.S. where significant amounts

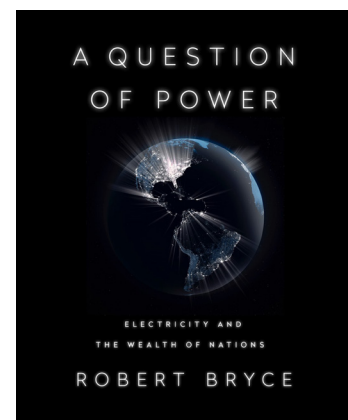
of gas are being flared due to lack of pipeline infrastructure. Perhaps some of the jobs that are being lost in the U.S. oil and gas industry could be replaced by jobs embarking on a much needed national infrastructure program that could include infrastructure expansion to promote more use and export of homegrown, low emission, reliable and reasonably priced American natural gas.

Though perhaps exaggerated, there has been much press on methane leakage from natural gas infrastructure over the past decade. Besides elimination of flaring, work remains on improving existing and future natural gas infrastructure to eliminate methane leakage. The incentive to industry is obvious: Fewer leaks means more methane sold.

No industrial processes are free from environmental costs. The question is how much of the impact on the environment from production and transportation of natural gas is acceptable? But this can be said about any fuel source needed to generate electricity. All energy sources — including wind and solar — involve significant environmental trade-offs. In the cases of wind and solar, those trade-offs can include larger land use; significant harm to species such as bats, birds and bees; noise; more transmission lines; and visual blight, among others.

### ACCESS TO ELECTRICITY AS A HUMAN RIGHT

As Bryce says in the closing chapter of *A Question of Power*, “We need more human flourishing, not less.” Take the case of women, already mentioned, whose lives in many, but not all, parts of the modern world have been improved immeasurably by electricity and elimination of menial tasks such as hauling water, washing clothes by hand or gathering wood for a stove. Bryce views access to electricity for women and the rest of humanity as a fundamental 21st century human right, on par with clean water and clean air.



Source: Robert Bryce

He concludes the book by expressing confidence that the world can adapt to climate change without abandoning in abject poverty the billions of people in the world living in low-watt and unplugged places.

*A Question of Power — Electricity and the Wealth of Nations* is an enjoyable and thought provoking read (or audio book). I also recommend the author's accompanying documentary, *Juice: How Electricity Explains the World*, and *Power Hungry*, his excellent and highly informative weekly podcast on energy issues. And no, I neither consulted with the author before this review nor received a kickback! ▲

### ABOUT THE AUTHOR

**Paul Yale, CPL**, is a partner at the law firm Gray Reed ([grayreed.com](http://grayreed.com)). His decades of experience in both the domestic and international oil and gas industry include 27 years with ExxonMobil Corp. and its predecessors, where he served as manager of land for its U.S. Production Organization, overseeing all land activities in the U.S. lower 48. Upon retiring from ExxonMobil in 2007, Yale immediately reentered private law practice, focusing exclusively on oil and gas title, transactional and dispute resolution matters. A licensed attorney in eight states and board certified in Oil, Gas & Mineral Law by the Texas Board of Legal Specialization, he has worked in virtually every major U.S. oil and gas basin — both onshore and offshore.